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ANNUAL REPORT OF THE
SURGEON GENERAL OF THE
PUBLIC HEALTH SERVICE
OF THE UNITED STATES

FOR THE FISCAL YEAR
1915



WASHINGTON
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1915

TREASURY DEPARTMENT,
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Public Health Service.

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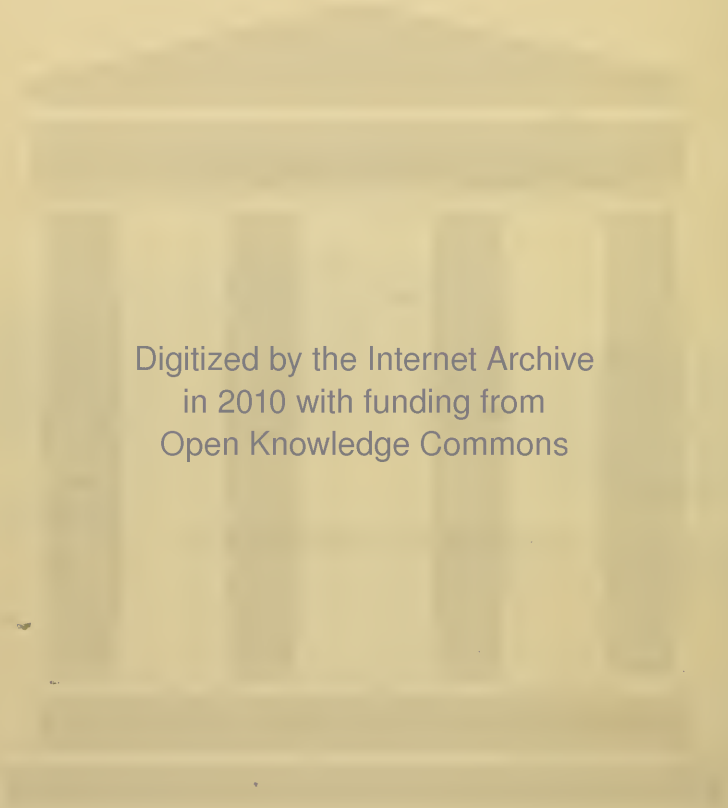
TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, December 6, 1915.

SIR: In accordance with section 9 of the act of Congress approved July 1, 1902, "An act to increase the efficiency and change the name of the Marine-Hospital Service," I have the honor to transmit herewith the report of the Surgeon General of the Public Health Service for the fiscal year 1915.

Respectfully,

W. G. McADOO,
Secretary.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.



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OPERATIONS OF THE UNITED STATES
PUBLIC HEALTH SERVICE.

1915.

ANNUAL REPORT OF THE SURGEON GENERAL OF THE PUBLIC HEALTH SERVICE.

TREASURY DEPARTMENT,
BUREAU OF THE PUBLIC HEALTH SERVICE,
Washington, D. C., October 1, 1915.

SIR: In accordance with the act of July 1, 1902, I have the honor to submit for transmission to Congress the following report of the operations of the Public Health Service for the fiscal year ending June 30, 1915. This is the forty-fourth annual report of the service, in the one hundred and seventeenth year of its existence.

Administrative supervision of the work of the service is conducted through the seven divisions of the bureau, and operations for the fiscal year are herein reported under the titles of the divisions, as follows:

- (1) Scientific research.
- (2) Foreign and insular quarantine and immigration.
- (3) Domestic (interstate) quarantine.
- (4) Sanitary reports and statistics.
- (5) Marine hospitals and relief.
- (6) Personnel and accounts.
- (7) Miscellaneous.

The administrative personnel of the bureau throughout the year has consisted of the following:

Surgeon General Rupert Blue.

Assistant Surgeon General A. H. Glennan, in charge of Division of Personnel and Accounts.

Assistant Surgeon General W. G. Stimpson, in charge of Division of Marine Hospitals and Relief.

Assistant Surgeon General L. E. Cofer, in charge of Division of Foreign and Insular Quarantine and Immigration.

Assistant Surgeon General J. W. Kerr, in charge of Division of Scientific Research.

Assistant Surgeon General W. C. Rucker, in charge of Division of Domestic (interstate) Quarantine.

Assistant Surgeon General J. W. Trask, in charge of Division of Sanitary Reports and Statistics.

Chief Clerk D. S. Masterson.

SCIENTIFIC RESEARCH.

The scientific investigation of public-health matters and routine studies relating thereto have been carried on during the year in increasing degree through the Division of Scientific Research, in charge of Asst. Surg. Gen. J. W. Kerr. This was made practicable by reason of continuance of appropriations and enlargement of the organization begun the preceding year. In conformity with the provisions of law and for purposes of administration, the investigations of the division have been classified and conducted under several broad heads as follows: (1) Diseases of man, including hookworm disease, malaria, pellagra, trachoma, typhoid fever, and tuberculosis; (2) industrial hygiene, including occupational diseases; (3) school hygiene; (4) mental hygiene; (5) rural sanitation; (6) sanitary organization and administration; (7) viruses, serums, toxins, and analogous products; (8) pollution of navigable waters; (9) surveys of coastal waters, including shellfish areas; (10) treatment of industrial wastes; and (11) disposal of sewage.

In order to carry on the above lines of work, it has been necessary not only to increase the number of scientific workers but to provide additional office and laboratory facilities at places in the field. For this purpose existing stations, such as marine hospitals and quarantine premises, have been utilized wherever possible. Some of them have been made the regular field headquarters for different lines of work. For instance, malaria studies are carried on from New Orleans, the headquarters having been transferred from Mobile, Ala., within the year; pellagra studies from Savannah; industrial hygiene studies from Pittsburgh; rural sanitation studies from St. Louis; and studies of the pollution of navigable waters from Cincinnati.

At these places it has been practicable to conduct the work and to enlarge it with little or no additional overhead charges. Necessary laboratory facilities have been provided or added to. Temporary laboratories have also been installed at the Fishermans Island, Va., and Mobile, Ala., quarantine stations for studies of the pollution of coastal waters with special reference to the shellfish industry.

The hospital and laboratory authorized for special studies of pellagra at Spartanburg, S. C., has been equipped and put to the use for which it was intended.

As in previous years, the technical and purely laboratory studies have been carried on at the Hygienic Laboratory. The studies of leprosy have been continued at the leprosy investigation station. Advantage has been taken of the location of this station near Honolulu to cooperate with the chief quarantine officer in the enforcement of the quarantine laws and regulations by examinations of specimens on request and with the Territorial board of health by examinations of public health specimens in the prevention of the spread of infectious diseases.

With the providing of laboratory facilities at a number of the stations above referred to, arrangements have been made for cooperation also with the Bureau of Indian Affairs, this cooperation consisting of the examination of clinical and public health specimens as aids in diagnosis and in the control of diseases.

Studies of the sanitation of convict camps were carried on in behalf of the Office of Public Roads, Department of Agriculture, by means of the detail of a commissioned medical officer.

Medical officers were likewise engaged in studies of mine sanitation and the sanitation of the steel industry in cooperation with the Bureau of Mines, Department of the Interior. Reference is made in detail to all these studies under appropriate headings.

As the scientific work of the service proceeds, its importance becomes more and more apparent. It is safe to say that the results obtained from one line of study alone have been of many times greater value than the entire appropriation for studies of public health matters for the year. There is justification therefore for recommendations for enlargement of this work.

As previously stated, detailed mention is made of the several activities of the field stations and laboratories under separate appropriate heads. Many activities of the Hygienic Laboratory also are thus given special mention, the facilities of this station having been freely made use of in the development of the field investigations.

STUDIES OF HOOKWORM DISEASE.

For five years past the service has cooperated with the Southern State boards of health and the Rockefeller Commission in the movement for the eradication of hookworm disease, carrying out in general the plans of investigation that were inaugurated prior to the formation of the Rockefeller Commission. This commission went out of existence on December 31, 1914, but the service will continue its cooperation with the State boards.

Soil pollution.—In the sanitary survey to determine the degree of soil pollution in rural districts the State boards have now accumulated the following statistics:

Of a total of 250,680 farm homes, scattered over 653 counties in 11 States, 125,584 homes (50 per cent) had no privy of any description, so that a theoretical maximum of soil pollution was occurring around these homes.

The details for all the homes are as follows:

	Points.
1,360 homes with type A privies, at 100 per cent.....	136,000
842 homes with type B privies, at 75 per cent.....	63,150
965 homes with type C privies, at 50 per cent.....	48,250
8,247 homes with type D privies, at 25 per cent.....	206,175
113,682 homes with type E privies, at 10 per cent.....	1,136,820
125,580 homes without any privy, at 0 per cent.....	0
250,680 homes give total score of.....	1,590,395
Average privy index, 6.3 per cent.	

These figures (6.3 per cent) show a slight improvement over the average (5.8 per cent) for the 189,586 homes for which statistics had been accumulated up to the preceding report.¹

¹Annual Report, 1914, United States Public Health Service, p. 22.

Estimate of physical improvement of patients treated for hookworm disease.—Professional educators have repeatedly expressed a desire to have at their disposal statements of a mathematical nature that can be used to express the effects of hookworm disease upon the mental and physical status of school children.

In response to requests of this kind the division of zoology of the Hygienic Laboratory undertook a piece of cooperative work with the Rockefeller Sanitary Commission. The mental studies were conducted under the direction of Prof. Edward K. Strong, jr., and financed by the Rockefeller Commission. The physical and zoological studies were conducted under the direction of Prof. C. W. Stiles, as part of his regular official work; part of the physical studies were financed by the Rockefeller Commission. The detailed studies will be issued later as a joint report by Profs. Strong and Stiles.

One hundred and fifteen children were tabulated in the final results. They were examined physically and their condition was recorded; 186 characters were found to lend themselves more or less satisfactorily to comparison. These characters were summarized for each of the five groups that were later adopted and percentages were drawn to represent each of these characters for each one of the groups. These percentages were compared and the groups were classified in first, second, third, fourth, and fifth places in respect to each character; each place (1 to 5) was given a rating of 10 points for first place down to 2 for fifth place, and the total scores were compared.

Certain of the children were placed under treatment while others were not treated, and some weeks later the examinations were repeated and improvements noted.

The total number of score points was 5,580, and the theoretical maximum score any group could possibly obtain was 1,860 points.

The uninfected children (23 in number, group A) scored first place in the competition with 1,498 points (80 per cent of theoretical maximum) in the earlier examination; in the last examination this group fell to second place with 1,292 points (69 per cent of theoretical maximum).

The infected children who were untreated (12 in number, group B) won third place with 1,102 points (59 per cent of theoretical maximum) in the first test; in the last test they fell to fifth place with 849 points (46 per cent of theoretical maximum).

The infected children who were completely cured (36 in number, group C) won second place with 1,242 points (67 per cent of theoretical maximum) in the test conducted before treatment; in the last test, conducted after treatment, during which an average of 40.2 hookworms was collected from each patient, they advanced to first place with 1,366 points (73 per cent of theoretical maximum). Thus this group actually surpassed the uninfected group (A) by 4 per cent.

The infected children who were treated, but who upon final microscopic examination were found to be incompletely cured (32 in number, group D), won fifth place with 826 points (44 per cent of theoretical maximum) on the first test; during treatment an average of 93.4 hookworms per patient was collected from this group,

which then, on the final test, advanced to fourth place with 984 points (53 per cent of theoretical maximum).

A group of infected children (12 in number, group E) was treated and an average of 100.2 hookworms per patient was collected, but it was impossible to determine whether all the worms were expelled. This group won fourth place with 919 points (49 per cent of theoretical maximum) before treatment; it advanced to third place with 1,089 points (59 per cent of theoretical maximum) after treatment.

Comparing these 5 groups, in this manner, similarly to the comparisons made in intercollegiate athletic contests, they may be conceived as representing 5 communities that are competing for 5,580 units of value with a theoretical maximum of 1,860 points per community. All hookworm communities advanced after they were treated (C. D. E.), and one of these (C) actually outstripped another community (A) in which hookworm infection was not originally found; but when left untreated 1 community (B) fell backward in the results of competition. Broadly speaking, the statistics given may be taken as a comparative indication of the physical efficiency of the 5 communities.

In physical improvement many changes were noticed, but it was particularly the circulatory and respiratory systems in which treatment resulted in strikingly favorable changes. Other improvements were in height, weight, lung capacity, complexion, texture of hair, etc.

General results of measures against hookworm disease.—The campaign against hookworm disease in this country has undoubtedly resulted in the cure of numerous patients, in a widespread knowledge of the disease, in a greatly increased interest on the part of the laity in the subject of public health, in an improvement of some of the public-health regulations, in a greatly increased amount of instruction in the public schools along public-health lines, in increased public-health appropriations, and in an improvement in public-health organizations. It has not, however, as yet resulted in the improvement in rural sanitation that was hoped for. This latter part of the work has, in reality, only begun, and the efforts in this direction must be increased.

INVESTIGATIONS OF MALARIA.

The antimalarial work has been continued and extended during the year, and efforts have been made to systematize it and increase its usefulness. The general office and laboratories formerly located at Mobile, Ala., were transferred in November, 1914, to the marine hospital at New Orleans, La., where facilities for the conduct of the investigations are more advantageous.

Asst. Surg. Gen. H. R. Carter was in charge of all the antimalarial work until August 1, 1914, when he was relieved by Surg. R. H. von Ezdorf on the latter's return from Vera Cruz, Mexico. Subsequently Asst. Surg. Gen. Carter has been in charge of the studies on the relation of impounding reservoirs to the prevalence of malaria, which remains a special investigation, assisted, however, by members of the general force. This is composed of the following persons: Asst. Surg. R. C. Derivaux, Sanitary Engineer J. A. A. Le Prince, Technical Assistants H. A. Taylor and M. B. Mitzmain, and Asst. Epidemiologist T. H. D. Griffiths.

As in previous years, the investigations have been conducted in cooperation with the health authorities of the States and localities concerned. The work so far accomplished or in progress may be classified under the following headings: Collection of morbidity data, malaria surveys; demonstration work, scientific field and laboratory studies, educational campaign, and special studies of impounded waters, rice culture, and drainage projects.

MORBIDITY REPORTS.

By means of circulars to health authorities and physicians, an effort has been made to obtain information in regard to the prevalence and geographic distribution of malaria. The reports thus received showed a total of 204,881 cases reported during the year 1914 in the States of Alabama, Arkansas, Florida, Kentucky (six months), Louisiana (eight months), Mississippi, North Carolina, South Carolina, Tennessee, and Virginia (six months). The information so far accumulated seems to indicate that in the Southern States, with an estimated population (excepting Texas) of over 20,000,000, at least 4 per cent of the inhabitants suffer annually an attack of malaria.

The duty of compiling the morbidity reports of malaria on receipt in the bureau has since February, 1915, been placed in charge of the Division of Sanitary Reports and Statistics, to which it properly belongs.

SURVEYS.

Surveys of breeding places of *Anopheles*, together with a study of the geographic and climatic conditions, social, hygienic, and economic conditions, and the prophylactic measures best applicable for the control of malaria, were made in 34 selected localities, as follows:

Alabama: Mobile.

Arkansas: Altheimer, Arkansas City, Blissville, Blytheville, Brinkley, Clarendon, Crossett, Cummins, De Witt, Eudora, Forrest City, Helena, Little Rock, Marianna, Newport, Osceola, Stuttgart, Varner, Wynne.

Georgia: Brunswick, Jekyl and St. Simons Islands.

Mississippi: Electric Mills, Greenville.

North Carolina: Roanoke Rapids.

South Carolina: Eau Claire, Greenville, Hartsville, Rock Hill, Sumter.

Virginia: Emporia, Franklin, Wakefield.

These surveys have been of great value in the study of life and habits of anopheline mosquitoes. The observations made include the extent and selection of breeding places; species of anophelines; local conditions favorable and unfavorable for breeding of anophelines; hiding and resting places; distance of flight; biting time; migration, if any; effects of topography and vegetation on flight; importance of freight cars in the distribution of *Anopheles*; effects of temperature and wind at different seasons of the year. Of especial interest has been the study of the extent of the effect of industrial wastes which might be utilized for *Anopheles* mosquito control, such as the wastes from gas plants, the dye and bleaching wastes from mills, sawdust and shavings from lumber mills, salt-water washings from ice

plants, sewage discharges in streams; house wastes, such as ashes and garbage; and the effects of artesian-well waters having varying contents of salts and sulphureted hydrogen.

In addition, the effects of fish, water insects, such as water boatmen, plant life, such as aquatic plants forming "water shield," are being observed.

At all places where surveys were made a number of specimens of mosquitoes was collected and forwarded to Dr. L. O. Howard, consulting entomologist, United States Public Health Service, Washington, D. C., for the official determination of the species. Acknowledgment is hereby made for the valuable assistance rendered by him in this part of the work.

Many species have been determined, of which number a few are more or less definitely known to act as hosts for the transmission of the malarial parasite. Frederick Knab gives a list of 34 species of American *Anopheles*, of which number 8 have been definitely shown to serve as hosts for the malarial parasite. These are:

Anopheles albimanus.

argyritarsis.

crucians.

intermedium.

Anopheles pseudomaculipes.

pseudopunctipennis.

quadriraculatus.

tarsimaculata.

The most common species encountered in the Southern States where surveys have been made are *Anopheles crucians*, *quadriraculatus*, and *punctipennis*. The last named, *Anopheles punctipennis*, is not considered to be a transmitter of malaria. *Anopheles crucians*, according to experiments by Beyer and his coworkers, is said to be a transmitter of the estivo-autumnal parasite only, but this needs confirmation. It is evident from this that *Anopheles* mosquitoes may be present and yet no malaria prevail, and again, the prevailing species may determine the type of malaria. *Anopheles quadriraculatus* will transmit all three types of malarial parasites, and this species is the one most commonly found in the Southern States where malaria prevails.

In most of the places where surveys were made, a report of conditions, together with recommendations for the abatement of mosquito-breeding places, was submitted to the mayor and local health officer. These recommendations were generally based upon advice of Sanitary Engineer J. A. A. Le Prince. No antimalarial campaign can be successfully and economically conducted without making surveys on the lines given.

Antimosquito measures.—The measures generally recommended are, briefly, the following:

(a) Grading and training of streams, creeks, or similar natural watercourses so as to favor a free current.

(b) Drainage for the removal of standing water or to produce a movement of water unfavorable to mosquito breeding.

(c) Filling in of low places that are too low to drain or which can not be drained economically.

(d) Oiling and larvacides.

(e) Natural enemies: Stocking with top-feeding minnows is a measure applicable in certain ditches, ponds, pools, swamps, streams, and many other bodies of water.

DEMONSTRATION WORK.

As a result of surveys made, the following communities have undertaken active antimosquito work with especial reference to eradicating or controlling malarial fever:

Roanoke Rapids, N. C.—Following surveys made by Asst. Surg. Gen. H. R. Carter and Surg. R. H. von Ezdorf, in 1913, Dr. T. W. M. Long, a physician in the employ of several mills, secured a fund amounting to \$3,600 for antimalarial work. The following is a summary of the work done and cost of same:

6½ miles of ditching, clearing, and removal of cans, etc-----	\$2, 931. 37
3,000 gallons of oil-----	293. 20
Inspection and maintenance -----	323. 48
	<hr/> 3, 548. 05

Another survey was made in October, 1914, one year after the first, and as a result of the work anopheline-breeding places had been eliminated and no breeding was found.

The malaria index as shown by blood examinations in 1913 was 13.75 per cent and in 1914 was 4.4 per cent, a decrease of 9.35 per cent, equal to a reduction in the incidence of malaria of 67.7 per cent in the one year. It was reported by Dr. Long that 95 per cent of the cases of malaria which occurred during the year 1914 were relapses. It is understood that a fund of \$1,500 has been raised for the continuation of the work during the present year.

Electric Mills, Miss.—Upon the request of Dr. Cecil Champenois for assistance in his antimalarial operations a survey was made and an index taken during May, 1914, and again in April, 1915. Some ditching, filling, and oiling were done, and an apparent reduction was noted in the incidence of the disease. The malarial index in 1914 was 11.7 per cent and for 1915 was 3.8 per cent, a reduction of 7.9 per cent, or an improvement of 67.5 per cent in the one year. The cost of maintenance of the work during the past three years was estimated to be \$1,000.

Other active antimalarial campaigns have been conducted as a result of surveys made at the following places:

Hartsville, S. C., drainage and oiling.

Greenville, S. C., drainage.

Stuttgart, Ark., screening.

Brunswick, Ga., drainage and filling.

Brinkley, Ark., educational.

Emporia, Va., ditching.

Cummins, Ark.—Here is located the State penitentiary. The commissioners will carry out measures of drainage and screening which were outlined in a written report made by Sanitary Engineer Le Prince, after a survey there in May, 1915.

At Lock 12 on the Coosa River, a camp of the Alabama Power Co., a survey was made and a malarial index taken in October, 1914, and again in May, 1915. The officials of the Alabama Power Co. have employed a physician to look after the sanitation and health of this camp and will carry out recommendations that were made with reference to quinine prophylaxis and screening.

The season of mosquito prevalence begins in the Southern States in March and April and continues until November. Antimosquito measures should therefore be planned and begun in the winter months, but much depends upon their character and extent and the climatic conditions. The work should extend, for practical purposes, a quarter of a mile or more beyond the corporate limits or bordering residences to be benefited.

SCIENTIFIC STUDIES.

The laboratories at New Orleans have been equipped with microscopes, incubators, photographic apparatus, and many accessories for carrying on blood work and making practical and biological studies.

Among the problems now being considered are:

1. Effects on malarial parasites of remedies in treatment.
2. Infectivity of the different species of *Anopheles* (*punctipennis*, *quadrinaculatus*, and *crucians*).
3. Life history of infected *Anopheles* in captivity.
4. Hibernation of infected *Anopheles* under artificial conditions.

There are also several problems being considered in connection with measures for the control of malaria.

Types of infection.—With a view to determining microscopically the types of malarial fevers prevailing in the State of Mississippi, a circular letter was sent to physicians representing every county in the State requesting them to furnish blood smears from their active and chronic cases, for which purpose slides, slide boxes, history blanks, and franks for mailing were furnished.

Of 428 blood specimens submitted and examined 225 were found positive, 132 of these being tertian, 91 estivo-autumnal, and 2 mixed. These were from 45 of the 79 counties in the State. In 11 counties only tertian infection was found, in 5 counties only estivo-autumnal, and in 29 counties both tertian and estivo-autumnal.

Malarial index work.—Blood specimens for microscopic examination have been collected from a number of apparently healthy persons, selected at random, to determine the percentage, the malarial index, of persons in the community who harbor the parasite of malaria in their blood. The specimens were taken from persons who voluntarily submitted themselves. The examination of the specimens was made in the laboratory at headquarters.

Considerable interest has been manifested by the people in the various localities visited, as also by the State and local health officers, in this part of the work; and this interest was stimulated on account of the reporting of positive findings to individuals in order that they might seek appropriate treatment.

So far 13,526 blood specimens from localities in the States of Alabama, Arkansas, Mississippi, North Carolina, South Carolina, and Virginia have been examined, 1,797 of which proved positive. The percentage of infection found varied from 1.9 per cent in certain localities to 40.9 per cent in Bolivar and Washington Counties, in the Yazoo Valley, Miss., where also the largest number of persons (1,666) were examined. The ages of the persons in whom infection was found ranged between 9 months and 85 years. The infection rate among white persons was about 8 per cent and among colored persons 20 per cent.

Mosquito hibernation.—From February 2 to June 1, 1915, Technical Assistant M. B. Mitzmain was engaged in making special studies at Scott, Miss., of the hibernation of anopheline mosquitoes and the period of the year when infection of *Anopheles* occurs under natural conditions.

He dissected and examined 2,122 *Anopheles* and found that none of those that had undoubtedly hibernated was infected, and that the first infected mosquito found was on May 15, 1915. This is an observation of special importance for its bearing on determining the period of the year when quinine should be taken for prophylactic purposes. A report of this investigation has been published in the Public Health Reports and reissued as Reprint No. 290.

EDUCATIONAL MEASURES.

In the ordinary commercial towns, public interest must be aroused in order to create a demand for health work. Educational work must be conducted, and the people taught that the disease is preventable. It is an asset to any town to advertise its freedom from malaria, particularly in the Southern States.

Illustrated lectures were accordingly given by the different working parties at various places visited. For this purpose each field party was furnished with a slide-projection apparatus and a number of photographic slides illustrating the life of mosquitoes, parasites of malaria, and preventive measures such as ditching, oiling, screening, etc. The latter were reproductions of photographs taken at different localities visited during the progress of surveys.

Considerable general correspondence has been had with physicians and health officers in response to inquiries and requests for information regarding malarial fevers. Many requests are received for publications on the subject.

A very popular pamphlet is the catechism on the subject of malarial fevers, entitled "Malaria—Lessons on its Cause and Prevention," prepared by Asst. Surg. Gen. H. R. Carter, and published in July, 1914, as Supplement No. 18 to the Public Health Reports. A circular letter was sent to State health officers in the Southern States inviting attention to this publication and requesting that the school authorities should be urged to introduce it in the schools. Steps to this end have already been taken by the proper authorities in the States of Arkansas, Florida, Louisiana, and South Carolina.

Other publications issued during the year for educational purposes in connection with investigations of malaria are the following: Drainage As An Antimalarial Measure; Oiling As An Antimosquito Measure; and Anopheline Surveys, Methods of Conduct, and Relation to Antimalarial Work.

RICE CULTURE STUDIES.

To the extension of rice culture in certain sections has been attributed the increase of anopheline mosquitoes and a proportionate increase of malarial fevers. The only observations thus far made have been in the vicinity of Stuttgart, Ark. These studies will be continued to cover varying periods during the different steps in rice

culture; seasonable prevalence of mosquitoes in rice fields; habits of anophelines in relation to rice culture.

DRAINAGE PROJECTS.

Several of the Southern States are carrying out drainage projects for the reclamation of swamp lands. In the State of Tennessee the legislature recently authorized a bond issue of \$400,000 for carrying out such a project, involving Dyer, Lake, and Obion Counties. The State health officer, Dr. R. Q. Lillard, made a request that in connection with the drainage work plans be included for the reduction or control of the malaria-bearing mosquitoes and thereby accomplish the double purpose of reclamation of lands, together with antimalaria work.

Accordingly a conference was held by Surg. von Ezdorf with Dr. Lillard in May, 1915, for the purpose of making arrangements to co-operate with the State board of health in the carrying on of anti-malarial measures in connection with this project.

It is considered that the question has an important public-health aspect and that there will be a large field for work of this character in the Southern States where there are large areas of swamp land and where malarial fevers prevail to a considerable extent.

HEMOGLOBINURIA.

During the fall, beginning with the month of October and including the months of November, December, and January, hemoglobinuric fevers are reported in a number of places in the Southern States, where malaria prevails to a large extent. The relation of hemoglobinuria and malaria will be taken up as opportunity affords.

From inquiries made at a number of places it appears that hemoglobinuria rarely occurs among negroes, although malarial fevers occur much more extensively among negroes than is generally believed.

IMPOUNDED WATERS.

The first suggestion in regard to the importance of making studies of the relation of impounding reservoirs to the prevalence of malaria was made by Asst. Surg. Gen. H. R. Carter when at Blewett Falls, N. C., in November, 1913. Consideration of this subject showed that in the Southern States it is estimated that over one hundred millions of dollars have been invested in impounding reservoirs to permit the use of water power for industrial purposes. The influence of these artificial bodies of water in the production of malaria is, however, a subject of complaint in many communities. In view of the variance of opinion on a subject of so much importance it was decided to undertake a comprehensive investigation with a view to determining the actual effects of this kind of ponds in producing malaria and suggesting adequate remedial measures.

The first actual studies were made by a field party headed by Dr. Carter at Hartsville, S. C., in July, 1914. Since then studies have been made of the following places: Blewett Falls, N. C., in July and September, 1914 (about 15 days in each month); Lock 12 on the

Coosa River, Ala., October 13 to November 19, 1914, by Sanitary Engineer Le Prince and Mr. J. V. Donley, engineer, Alabama State Board of Health, and in June, 1915; Parr Shoals, S. C., in July, 1914, and February 15-21, 1915; Georgia-Carolina Power Co., Savannah River, near Augusta, Ga., in February-March, 1915.

So far the following publications embodying the results of the investigations have been published: Impounded Water, Some General Considerations on its Effect on the Prevalence of Malaria; Impounded Waters, Survey at Blewett Falls; and Impounded Waters, a Study on the Coosa River.

The investigations contemplate the making of physical and zoological surveys, the first to determine whether the physical conditions are such as to make the places examined suitable breeding places for mosquitoes, and the second to determine what places are actually breeding malaria-bearing mosquitoes. In order to reach definite conclusions these studies will be prolonged for a number of years.

PELLAGRA INVESTIGATIONS.

Field investigations of pellagra were continued during the year under the direction of Surg. J. Goldberger. These investigations have been conducted at the marine hospital, Savannah, Ga.; Georgia State Sanitarium, Milledgeville, Ga.; Baptist Orphanage and Methodist Orphanage, Jackson, Miss.; and the State convict farm, Greenfield, Miss. In addition, insane asylums in Northern and Southern States have been visited to obtain pertinent data; field surveys made in a number of States, especially Arkansas, Florida, Louisiana, and Texas; and special clinical and laboratory studies undertaken at Spartanburg, S. C., and the Hygienic Laboratory, Washington, D. C.

The following lines of research were followed during the year under the immediate direction of Dr. Goldberger: (1) Epidemiological studies at selected institutions; (2) studies of diet in relation to treatment; (3) feeding experiments to determine the value of diet in prevention.

EPIDEMIOLOGICAL STUDIES.

A number of observations show that although in many asylums new cases of pellagra develop in inmates even after 10, 15, and 20 years' residence, clearly indicating thereby that the cause of the disease exists and is operative in such asylums, yet at none has any one of the employees contracted the disease, though living under identical environmental conditions as the inmates and many in most intimate association with them.

In order to obtain precise data bearing on these observations, 12 asylums for the insane in Northern States were visited, the pellagra incidence in them investigated, and their dietaries compared with those of 14 asylums located in the South.

Milledgeville, Ga.—Studies of the records of the State Sanitarium at Milledgeville, Ga., dating from January 1, 1910, were continued by Assistant Epidemiologist D. G. Willets, under Dr. Goldberger's direction, in order to determine the rate of endemic prevalence of pellagra at this institution. The data already obtained show that 21 per cent of the deaths occurring in the sanitarium from 1910 to 1913 were caused by pellagra, the disease having been constantly highly

prevalent. On October 14, 1914, for instance, 253, or 6.7 per cent, of the 3,751 patients were pellagrins, and on June 19, 1915, 338, or 8.9 per cent, of the 3,796 patients. Out of 996 patients admitted in 1910, excluding those that died or were discharged during the year, or had pellagra on admission or within a year of admission, there remained after one year 418, and of this number 32, or 7.65 per cent, have developed pellagra after admission. In contrast with this fact, none of the employees living in substantially the same environment have developed the disease.

Jackson, Miss.—Similar studies at the Methodist Orphanage (since May, 1914) and the Baptist Orphanage (since September, 1914), Jackson, Miss., have been made and are being continued by Asst. Surg. C. H. Waring, under the direction of Dr. Goldberger. These studies include the occurrence of the disease among 450 persons residing at the two institutions, with consideration of all possible factors, such as drainage, sewerage, water supply, diet, etc.

At one of the two orphanages it was found that on July 1, 1914, out of 211 inmates 68, or 32 per cent, had pellagra. The age distribution showed that practically all these cases were in children between 6 and 12 years old. Inasmuch as all the orphans live under identical environmental conditions, the freedom from the disease shown by the older and younger children constitutes a remarkable epidemiological fact.

At the other orphanage, out of a total population of 226 Dr. Waring found in September, 1914, 136 positive cases of pellagra and 24 with symptoms indicative of the disease.

Greenfield, Miss.—Studies of the effect of a one-sided diet have been conducted since January, 1915, at the State convict farm, Greenfield, Miss., in immediate charge of Asst. Surg. G. A. Wheeler and the supervision of Surg. Goldberger. These observations include the physical and mental condition of 12 inmates and the dietary of all the people on the farm, numbering over 90.

VALUE OF DIET IN TREATMENT.

From the earliest times it has been recognized that diet is an important element in the treatment of pellagra. Accordingly it was decided to determine scientifically the degree of its importance, and early in the fiscal year experiments to this effect by Special Expert W. F. Lorenz under the direction of Surg. Goldberger were begun in one of the wards of the Milledgeville Sanitarium, courteously opened to the service by the superintendent and board of trustees. Since September 1, 1914, when Dr. Lorenz severed his connection with the service, this work has been continued by Assistant Epidemiologist Willets. The experiment has consisted in furnishing to the patients in the ward the kind of diet which in the opinion of the service officers would be adequate to their condition. The number of patients receiving this diet has been 100, 80 of whom were pellagrins when the experiment was begun and 20 nonpellagrins. Of the pellagrins 73 have been constantly under observation. None of these pellagrins have given evidence of a recurrence of pellagra to this date.

A similar success followed the treatment of pellagra patients at the marine hospital, Savannah, Ga., with Passed Asst. Surg. J. R.

Ridlon in local charge and at the Baptist and Methodist Orphanages, Jackson, Miss., under the immediate supervision of Asst. Surg. Waring, where, as reported above, the disease used to be highly prevalent.

VALUE OF DIET IN PREVENTION.

The value of a proper diet in the prevention of pellagra has also been tested at the two orphanages at Jackson, Miss., where over 400 inmates and employees have been kept under observation, and at the Milledgeville State Sanitarium, Georgia, where 100 patients have been receiving a supplementary diet provided by the service. Both at the orphanages and among these Milledgeville cases the disease has disappeared.

RESULTS OBTAINED.

The striking results following the feeding experiments of Dr. Goldberger and his associates, as confirmed also by the service officers at Savannah, Ga., and Spartanburg, S. C., seem to justify the conclusions (1) that pellagra is not a communicable (neither infectious nor contagious) disease, but that it is essentially of dietary origin; (2) that it is dependent on some yet undetermined fault in a diet in which the animal or leguminous protein component is disproportionately small and the nonleguminous vegetable component disproportionately large; and (3) that no pellagra develops in those who consume a mixed, well-balanced, and varied diet.

In the light of Dr. Goldberger's experiments, the prevention and eradication of pellagra will therefore depend essentially on the substitution of a mixed, well-balanced, varied diet for the restricted, one-sided diet that the individual will be found to have consumed prior to the development of symptoms. The evidence is daily becoming stronger that in the South this could be largely accomplished by the introduction of common dried legumes into the winter dietary. A valuable step in this direction would be an increase in the cultivation of some of the varieties of beans and peas and their preservation in the dried state for winter consumption.

It would appear that the investigations under Dr. Goldberger have already resulted in working out a rational and practical method for preventing the disease which has assumed such serious importance in the Southern States.

Preliminary reports of these studies have been published in the Public Health Reports and issued as Reprints Nos. 203, 218, and 228.

CEREBROSPINAL FLUID IN PELLAGRA.

Reference was made in the last annual report to the studies of the cytology of the cerebrospinal fluid in pellagra being conducted by Special Expert W. F. Lorenz at the Georgia State Sanitarium, Milledgeville, Ga. These studies were completed during the year. The data obtained refers to 153 examinations of spinal fluid made in 106 cases, in which practically every clinical type of pellagra was represented. The examinations consisted of a cell count, an estimation of the globulin constituent, and a Wassermann (Noguchi) and Lange's colloidal gold chloride tests.

The results of this investigation seemed to indicate that a lymphocytosis of the cerebrospinal fluid does not occur in uncomplicated pellagra; that globulin excess of the spinal fluid is only occasionally observed; that Lange's colloidal gold chloride test is uniformly negative in pellagra; that the Wassermann is negative with a few exceptions (in this investigation the exceptions were moribund cases which gave weakly positive reactions with blood serum); and that the spinal-fluid findings would seem inconsistent with a conception that pellagra is an infectious disease of the central nervous system.

The complete report of this work has been published in the Public Health Reports and issued in Reprint No. 218.

PELLAGRA STUDIES AT SAVANNAH, GA.

Studies of pellagra were continued during the year at the marine hospital, Savannah, Ga. These included (1) clinical observations upon pellagra patients, (2) animal experimentation, and (3) laboratory studies.

Clinical observations.—There were treated by Passed Asst. Surg. J. R. Ridlon during the year 78 patients as follows: 51 (male) at the marine hospital, 12 (white female) at the Savannah Hospital, 1 (colored female) at the Georgia Infirmary; and 14 furnished dispensary relief. Many consultations were also held in regard to patients admitted to other hospitals and not treated as patients of the service.

The study of these patients has brought out the apparent intimate relation between the consumption of a faulty diet and the onset of the disease. Marked success followed the feeding of cases with a liberal diet, including a full proportion of proteid material. The use of drugs for the treatment of pellagra has been practically eliminated in view of the proved efficacy of a well-regulated diet for this purpose.

Animal experimentation.—The animal inoculation studies begun in the previous fiscal year were continued and completed by Surg. E. Francis. Although every kind of tissue, secretion, and excretion from a considerable number of grave and fatal cases was obtained and inoculated in every conceivable way into more than 100 rhesus monkeys as well as a large number of guinea pigs and rabbits, the results were uniformly negative. Certain reported claims of successful transmission of pellagra to monkeys failed, therefore, of confirmation, and evidence was on the contrary obtained against the theory of communicability of the disease.

Laboratory studies.—The laboratory work embraced culture studies of body fluids of pellagrins by anærobic methods and routine examinations.

At the suggestion of Dr. Goldberger, Surg. E. Francis made during the year culture studies of the blood and spinal fluid of pellagrins by the newer anærobic methods. The results were negative, and furnish therefore corroborative evidence of negative results of animal inoculations.

The routine examinations were made by Dr. Ridlon and included 2,067 urine examinations for indican, 1,046 microscopic fecal ex-

aminations for intestinal parasites, and Noguchi tests and blood counts upon practically all the patients admitted to the hospital.

Educational work.—As the clinical studies of cases are being gradually discontinued at Savannah, the station has been made the center for educative work in regard to the treatment and prophylaxis of pellagra.

About 80,000 pieces of literature on pellagra were mailed from Savannah to physicians and to other persons interested in this disease in the Southern States.

PELLAGRA STUDIES AT SPARTANBURG, S. C.

The special studies of pellagra mentioned in the last annual report have been continued at the hospital and laboratory at Spartanburg, S. C. The personnel at this station has been 1 passed assistant surgeon (medical officer in charge), 1 assistant surgeon, 1 pharmacist, 1 clerk (temporary), 1 biochemist, 2 assistant biochemists, 1 food analyst, 1 head nurse and dietitian, 5 nurses, and 11 attendants. The work carried on at the station may be roughly classified into three general divisions: Administrative, clinical, and laboratory. The laboratory work has been under the direction of Dr. Carl Voegtlin, professor of pharmacology, Hygienic Laboratory, while the administrative and clinical work has been under the direction of the medical officer in charge, which position was held by Passed Asst. Surg. R. A. Herring until January 20, 1915, when he was relieved by Passed Asst. Surg. R. M. Grimm.

A considerable amount of work was necessary in making the alterations and repairs to the buildings leased by the service in order to adapt them to the purposes of the work. One building has been equipped and furnished for use as a hospital and laboratory, and another for use as a hospital annex. Three rooms in the hospital building have been converted into a chemical laboratory and a large amount of chemicals and apparatus obtained by way of equipment. The hospital was opened on August 17, 1914, with a capacity of 22 beds. On June 10, 1915, by the opening of the annex, this capacity was increased to 34, and can be raised to 40 if necessary. During the months of May and June the hospital has been filled to its capacity and many applicants turned away on account of lack of accommodations. The patients have been selected from a long waiting list of applicants as vacancies occurred. A growing correspondence has been carried on incident to the numerous applications and inquiries in order to select suitable cases for study and treatment.

The treatment of the patients has been largely dietary. Three regular diets have been in use and a number of special ones prescribed from time to time in cases requiring them. By the use of diet-record forms accurate records of the kinds, amounts, and methods of preparation of the food consumed by the patients have been kept. The foods have been weighed before and after cooking and before and after serving; so from these data the exact amount of uncooked food consumed by a patient may be calculated for each meal, and consequently the total amount of food consumed by the patient during the entire stay in the hospital is known. These weighings have been made by the head nurse and dietitian. The data thus

obtained in connection with the clinical course of the cases may furnish important information regarding the relationship existing between diet and pellagra. Clinical histories and clinical notes have been taken as completely and thoroughly as practicable. A fairly well-equipped clinical and bacteriological laboratory has been recently established, which will afford opportunity for an increased amount of clinical laboratory work in connection with the study of the cases.

In addition to the treatment of patients in the hospital, an out-patient department has been conducted which has kept the hospital in touch with the local pellagra situation. These out-patients have been served daily (at noon) one well-balanced meal, which with a placebo has been the only form of treatment.

The following table will show the number of pellagra patients treated and the results:

Hospital patients:	
Total admitted (Aug. 17, 1914, to June 30, 1915)-----	110
Discharged improved-----	34
Discharged not improved-----	40 ¹
Died-----	5
Remaining under treatment June 30, 1915-----	31
Out patients:	
Total treated (Aug. 17, 1914, to June 30, 1915)-----	20
Discharged improved-----	2
Discontinued treatment-----	6
Remaining under treatment June 30, 1915-----	12

The clinical work has been under the direction of the medical officer in charge, assisted by Asst. Surg. W. F. Tanner, who was detailed to the station September 18, 1914.

Laboratory and dietary studies.—The position of biochemist was held by Dr. Andrew Hunter until January 30, 1915, and by Dr. J. R. Murlin from March 1 to June 30, 1915; the positions of assistant biochemist have been held by Dr. R. C. Lewis and Mr. M. H. Givens, Mr. Rudolph H. Harries was appointed food analyst on June 18, 1915. Prof. Carl Voegtlin, Chief of the Division of Pharmacology of the Hygienic Laboratory, has had supervisory relation to the work since its beginning, and since April he has had direct charge of the laboratory operations at Spartanburg.

The investigation on the relation of diet to pellagra, briefly outlined in last year's report, was carried out during the present year. On the assumption that pellagra is due to the continuous consumption of a mainly vegetable diet, characterized by a high content in carbohydrates with a relatively low content in proteins, the effect of such a diet was studied on pellagrins. On the other hand, the effect on patients of a diet rich in animal food, containing considerable amounts of animal protein, was also studied. It may be stated that in a general way the above-mentioned conception concerning the relation of diet to pellagra was found to be correct. The vegetable diet was very inefficient for the treatment of pellagrins, whereas the diet rich in animal protein almost always leads to a more or less rapid improvement in the condition of the patients.

¹ Discontinued treatment.

In order to determine whether pellagra is a deficiency disease, extracts of certain foods rich in so-called vitamins were prepared in large quantities at the Hygienic Laboratory in Washington. These extracts were then administered to patients and their therapeutic action was noted. The results obtained will be reported in the near future.

The metabolism of pellagrins was subjected to an intensive study reported in Hygienic Laboratory Bulletin No. 102, now in press. Another paper in Hygienic Laboratory Bulletin No. 101 describes a new method for the quantitative estimation of gastric pepsin, which proved of great value in the study of gastric functions in cases of pellagra. It was found that in almost all severe cases gastric digestion is greatly reduced, and pepsin and free hydrochloric acid usually absent. If the disease has progressed to this stage, the return of the gastric function to normal conditions is a very slow process, which requires considerable time. Patients, who have otherwise apparently recovered, may still exhibit this abnormality.

The study of urinary indican revealed the fact that this product of intestinal putrefaction may be entirely absent in marked cases of pellagra, provided that the patient consumes a mainly vegetable diet. On the other hand, a diet rich in animal protein (milk and meats), leads to a marked increase in the excretion of indican. It seems, therefore, that no relation exists between intestinal putrefaction and the intensity of the disease, as far as could be ascertained by the study of indican excretion.

The absorption of food from the intestines seems to be normal in pellagra, except in cases with excessive diarrhea, where a reduction of food absorption is observed. The study of the protein metabolism in pellagra has thus far not revealed any abnormality. The other phases of metabolism are under investigation. Valuable records of the quantitative consumption by the patients of the various dietary constituents were obtained, which will permit in time to determine the exact nature of the diet which may be responsible for the production of pellagra.

On account of the numerous changes in the personnel of the workers at the station during the year the continuity of the work has been interrupted from time to time, so that the general progress of the work has not been so consecutive as it is expected to be during the ensuing year. The equipment of the laboratory and hospital has just been completed, so that the station is now fully prepared to make laboratory and dietary studies on pellagra.

Animal experimentation.—Extensive feeding experiments on various species of animals conducted at the Hygienic Laboratory lead to the following conclusions: An exclusive vegetable diet is insufficient for the maintenance of health in certain higher mammalia. Following its use gastro-intestinal and nervous symptoms appear. Histological changes, which are very similar to those found in pellagra, are observed in the central nervous system and in the organs of these animals after death. The chemical composition of the brain and spinal cord shows marked changes from the normal, which are in some cases (according to the diet used) analogous to the chemical changes which were observed in the central nervous system of pellagrins.

In conclusion, it may be said that the experimental work on animals, the clinical observations, and the epidemiological data referred to in another part of the report corroborate each other and point to pellagra as being a dietary disease.

TRACHOMA.

TRACHOMA WORK IN THE APPALACHIAN MOUNTAINS.

The antitrachoma campaign in the Appalachian region during the past fiscal year has been a very active one, and has been carried on under the direction of Surg. John McMullen. The experience gained has further demonstrated that the method adopted by the service of establishing small ophthalmological and public health hospitals in the communities where the disease is known to exist presents the best solution of the trachoma problem. It serves the several purposes of curing the existing cases and of furnishing bases for the district work and a means of furthering education. The very gratifying results accomplished both in eradication and prevention through these hospitals has justified the enlargement of the fields of operation and the extension of the work to other States.

Besides the three trachoma hospitals which were previously established at Hindman (Knott County), Hyden (Leslie County), and Jackson (Breathitt County), Ky., on June 30 a hospital of 18 beds was formally opened at Coeburn, Wise County, Va., under favorable auspices and was ready for the reception of patients at the beginning of the new fiscal year. All arrangements have also been completed for the establishment of another trachoma hospital in the southwestern portion of the State of West Virginia. This will make a total of five trachoma hospitals in the three States of Kentucky, Virginia, and West Virginia, with the central office in Lexington.

The Hyden hospital was transferred during June to London, Laurel County, Ky. The number of patients at Hyden had decreased to such an extent that it was thought advisable to locate this hospital in a new field. London is situated on the railroad and is the distributing point for the remotely situated counties of Jackson and Clay, which are heavily infected with trachoma. The London hospital has been equipped to take care of the great number of patients who it is believed will seek relief. During the 20 months the hospital was in Hyden large numbers of trachoma cases were reached and a large percentage of them cured. In view of the limited number of hospitals, however, it was thought that each of them should be so situated as to accomplish the maximum amount of work possible. The Hindman hospital has been moved to new and more commodious quarters there, and is now prepared to better care for the larger number of trachoma cases seeking treatment.

The State and local authorities are cooperating in this work. Breathitt County, Ky., contributes liberally toward the rental of a building for the Jackson hospital. The county of Laurel and the town of London furnish a very suitable 2-story building, rent free, for the use of that hospital. The town and county authorities have furnished a new 2-story 9-room building, rent free, in Coeburn,

Wise County, Va., for the use of that hospital, while the State of Virginia has agreed to contribute \$1,200 per annum toward its support. The exact location in West Virginia for the fifth hospital has not yet been selected. Assurances, however, have been given that the local authorities will furnish a suitable house; and the State of West Virginia will contribute \$300 toward its maintenance and promises to increase this amount.

Eradication.—The Jackson hospital still continues to treat a large number of cases, and, like Hindman, its capacity has been too small to care for the numbers of patients seeking relief.

During the 12 months the total daily attendance at the three hospitals was 11,934, and 13,000 treatments were given. The average daily attendance at the hospitals was 33. The class of cases treated during the year are much the same as in the year previous, except that the longer the hospitals remain and the more extensive the campaign of education conducted the greater are the number who seek relief.

With the exception of the Hindman hospital, where rations are contracted for, the patients are subsisted in the hospitals, the Hyden hospital, recently removed to London, having been furnished with kitchen and table ware for this purpose. When it is considered that a large number of patients have been cared for, a total of 12,000 daily attendance, there is actually a decrease in the amount of cost over the previous year.

Now that these hospitals have been established for more than a year and the people are beginning to be educated to their importance, it has been necessary to prepare them for an increased number of patients. However, they have been maintained with strict economy, and the total daily cost of maintaining the three hospitals was only \$52, or an average of \$17.33 each per day.

A total of 1,067 cases were admitted to the hospitals and furnished subsistence on account of the need for either surgical or special care and treatment. The great majority of these trachoma patients are people who live in remote sections far removed from assistance, and who, but for the free care and treatment of the service hospitals, would remain victims of this disease practically the remainder of their lives. Besides communicating their infection to others, they would probably become burdens on their friends or public charges on the county.

The total number of days relief furnished was 10,284. In the three hospitals during the year 994 operations have been performed; of this number 375 were under general anesthesia and 619 were performed under local anesthesia. The results obtained in the eradication or the actual treating of these cases has been highly satisfactory. A large percentage of cases have been cured and relieved. Those others in which a cure has not been effected and are still being treated have been rendered noncommunicable by being under treatment. Hundreds of trachoma sufferers have, therefore, not only been relieved of a chronic contagious disease, but are enabled to resume their work and earn a livelihood.

Dispensary and hospital treatment, cost, operations, etc.

	Jackson hospital.	Hyden- London hospitals.	Hindman hospital.	Total.
Dispensary relief:				
Old cases applying for treatment.....	3,865	1,685	3,469	9,019
New cases applying for treatment.....	1,306	752	857	2,915
Total daily attendance.....	5,171	2,437	4,326	11,934
Total number of treatments given.....	5,694	2,671	4,527	13,132
Average daily attendance.....	14	7	12	33
Number of new trachoma cases.....	610	346	496	1,452
Number of cases impaired vision from trachoma.....	308	244	300	852
Cases corneal opacity from trachoma.....	230	65	44	339
Cases blindness applying to hospital.....	16	7	9	32
Cases ulcer from trachoma.....	47	24	22	93
Cases pannus from trachoma.....	189	76	100	365
Cases entropion from trachoma.....	96	37	40	173
Cases trichiasis from trachoma.....	83	24	16	123
Cases photophobia from trachoma.....	237	159	57	453
Cases conjunctivitis from trachoma.....	271	253	149	673
Cases glaucoma from trachoma.....	9	2	1	12
Cases trachoma cured.....	212	60	228	500
Hospital relief:				
Cases remaining from previous year.....	17	3	9	29
Cases admitted during year.....	403	187	448	1,038
Total hospital cases during year.....	420	190	457	1,067
Cases discharged during the year.....	411	190	447	1,048
Cases remaining close of the year.....	9	0	10	19
Total number of days relief furnished.....	4,855	1,579	3,850	10,284
Total number of rations furnished.....	5,797	1,340	3,287	10,424
Total cost of rations furnished.....	\$1,842.38	\$838.98	\$1,843.34	\$4,524.70
Operations:				
Under general anesthesia.....	95	59	221	375
Under local anesthesia.....	255	121	243	629
With grattage method.....	273	162	348	783
For entropion.....	50	24	71	145

The number of cured cases of trachoma recorded represents only those who returned to the hospital as requested or were actually seen by the medical officer in charge and therefore known to be cured. A large percentage of these cases live long distances from the hospital and, once cured, never return and their record cards are not completed. It is impossible, therefore, to estimate the number of cures accurately, but the number recorded is certainly short of the number actually cured.

When it is considered that thousands of persons suffering with trachoma, a dangerous contagious disease, would otherwise remain untreated, it is realized how far-reaching results have been obtained through these trachoma hospitals and the other public-health work done in this connection. It would be impossible to estimate with any degree of accuracy the number of people who have been saved from contracting this communicable disease by thus removing these thousands of foci of infection.

The preventive or educational side of the campaign has been considerably more extensive during this year than in the past, owing to the gradual perfecting of the organization. This phase of the work, which is of an importance equal to or greater than that of eradication, has been furthered by means of the hospitals themselves, as every patient upon presenting himself for treatment is informed of the communicable nature and seriousness of his trouble, instructed in the care of his eyes and how to prevent communicating the disease to others, and, while in the hospital, has these facts demonstrated to him daily by the use of individual towels, basins, drinking cups, bed linen, toilet articles, etc., and absolute cleanliness of his surroundings.

The doctors and nurses have followed up many of these cases to their homes for the purpose of determining the condition of the patient, his environment, instructing him in the care of his eyes and the simpler hygienic methods of home life; 1,308 such visits have been made to homes during the year in various parts of the State. Talks and lectures have been given in the schools, churches, etc., whenever possible. A total of 292 of these talks has been made during the year to audiences estimated at 17,200. Many of these talks were accompanied by lantern-slide demonstrations; and while some of them were before various medical societies, the great majority were made to lay audiences. There were 22,571 pamphlets distributed during the year telling of trachoma, how to prevent contracting it, what to do in case it had been contracted, and giving other information comprehensible to the laity. The question of education has been deemed of the utmost importance, and advantage taken of every opportunity to inform the public as to trachoma, especially, and public health generally.

It has taken some time to educate the people afflicted with this disease to the importance of cleanliness and the use of simple hygienic measures in their daily life. That results have been obtained, however, is evidenced by the noticeably better observance of hygienic precautions by those among whom this work has been done.

As a further means of carrying on the campaign of prevention and eradication lectures have been given and clinics held before medical societies in the various counties where no service trachoma hospitals are located with a view of interesting the local medical profession in the treatment of the disease. A sufficient number of trachoma cases were found by visiting the local schools and clinics arranged where these cases were operated on in the presence of the local doctors. The methods of the various surgical operations were demonstrated for the cure of this disease and its sequelæ, and the physicians were urged to perform the operations themselves. These clinics proved to be very successful, and usually all of the medical men of the town attended and showed sufficient interest to insure in a majority of places the continuance of this work. The expenses of these clinics, including the care and aftertreatment of the cases, were borne by the community, with the exception of the expenses of the service officer and the nurse accompanying him. The purpose has been to stimulate local interest in taking up the campaign after seeing the work demonstrated on the lines adopted by the service.

In numbers of the places visited small hospitals were already available, and the cases were operated on and treated in these. In others, however, where no hospitals existed, either temporary arrangements were made for the care of the patients in charge of a trained nurse, or a building was rented and equipped as a hospital by the town and county and a trained nurse left in charge under the direction of the local doctors. Although the time available has been limited, Surg. McMullen managed to hold nine such clinics in seven different counties in various sections of the State. A total of 162 operations were performed at these clinics, 9 talks were made to audiences estimated at 3,500 people, and the method of the care and treatment of trachoma was demonstrated to about 60 medical men. It is expected during the next fiscal year to continue holding these clinics in several counties. There have been numbers of requests to this

effect from other sections, but the general supervision of the work made it impossible for Surg. McMullen to respond to any more during this time.

A bill recently passed by the Kentucky Legislature requires each county to hold a school for instructing doctors, health officers, nurses, midwives, etc., as to the contagious eye diseases. The secretary of the State board of health has requested the service officer in charge of the trachoma work to visit with him several sections of the State to assist in conducting these schools. This is an opportunity for educational work which should not be overlooked. It will be impossible, however, for the medical officer in charge to accomplish all of this alone, and an additional medical assistant will, if possible, be detailed for duty in connection with the trachoma campaign.

The district nursing is to be extended at once, and a competent nurse will be employed to further this work as soon as her services can be obtained. It is the intention to extend the district work as much as possible, in addition to the house to house visits by the hospital nurses.

Survey extended.—In addition to the original survey of seven counties in 1912, for the purpose of determining the amount of trachoma in Kentucky, 16 other counties have been surveyed in detail. This survey was made principally among school children and a total of 18,016 people have been examined with the result that 7 per cent were found to have trachoma. The names of all children found to be suffering with trachoma were given to the teacher with the request that the parents be immediately notified that treatment should be given without delay. They were also informed that free treatment would be given at the service trachoma hospitals. A duplicate list was forwarded by the examining officer to the central office at Lexington, Ky., and trachoma literature was immediately mailed from there to the parents and guardians. The county health officer was likewise notified of these cases.

The systematic investigations in the Appalachian Mountains by the service have shown that trachoma is more or less generally prevalent with the heaviest infection about the junction of Kentucky, Virginia, West Virginia, and Tennessee. From the work that has already been done and observations made, there is no doubt also that this communicable disease is on the increase.

TRACHOMA IN DOUGLAS, ARIZ.

In response to a request of the board of education of Douglas, Ariz., approved by the State Board of Health of Arizona, Acting Asst. Surg. J. W. Tappan was directed to inspect the public schools of Douglas, with a view to determining the prevalence of trachoma among the school children.

During the investigation, which lasted from December 1 to December 3, 1914, 10 schools were visited and 2,417 school children examined by Dr. Tappan. Seventy-three cases of trachoma were found, giving a case rate of less than 3 per cent. In determining the diagnosis, not only marked cases of classical trachoma, but the so-called "border-line" cases were included. Catarrhal affections of the eyes, an acute chronic conjunctivitis, follicular conjunctivitis and blepharitis margi-

nalis were quite prevalent, about 40 per cent of the school children being so afflicted.

TRACHOMA IN TUSCALOOSA, ALA.

In accordance with requests from the State health officer of Alabama and the health officer of the city and county of Tuscaloosa, Passed Asst. Surg. R. A. Herring was detailed to make an examination of the school children of Tuscaloosa to determine the prevalence of trachoma among them. The investigation began March 22 and continued until March 31, 1915.

Tuscaloosa at the present time has an estimated population of 12,000 and a school enrollment of about 1,250. During the survey 1,122 pupils in the six city public schools were examined and, in addition, 240 students of the Alabama State University and 900 inmates of the Alabama State Hospital for the Insane, both institutions located at Tuscaloosa. Four hundred and ninety-seven public-school children outside of the city, but within the county, were examined. A majority of the rural schools had just closed when the survey was begun, but conditions in those visited would indicate that trachoma may be more prevalent in the rural districts than in Tuscaloosa. Thirty-two cases of trachoma were found in the city schools and 26 in the rural schools, giving a percentage of 5.1 and 6, respectively. In the State university only 1 case was found, and 6 cases in the State hospital for the insane, 5 in patients and 1 in a nurse.

Careful inquiry elicited the fact that the infection present in the schools has been of relatively recent introduction. Five of the cases at the hospital for the insane were undoubtedly of many years' standing and from their histories indicate trachomatous foci in the following counties in Alabama: Shelby, Marion, Etowah, Jackson, and Lamar, all in the northern part of the State, a region both geographically and economically somewhat like the mountainous section of eastern Kentucky.

The great majority of positive cases were of the early so-called follicular type, presenting an abundance of granulations on both lower and upper lids and involving both the tarsal cartilages and retro-tarsal folds, and were classified as trachoma only when there existed the accompanying evidences of active inflammation. The majority of cases were in the stage of active and progressive lymphoid hypertrophy. As would be expected in a group of cases of this character, well-advanced cicatrization was rarely observed. Other palpebral conditions found were a number of cases of acute conjunctivitis or "pink eye," blepharitis, sty, and numerous cases of chronic conjunctivitis or so-called "granulated lids."

The following recommendations were suggested to the local health authorities to limit the spread of the disease: Exclusion from the public schools of all known positive cases of trachoma, treatment of the suspicious cases, periodical examinations of the school children, and a publicity campaign to educate the people in the modes of spread, the dangers from the disease, and the method of prophylaxis by which it may be avoided.

TRACHOMA IN MANATEE COUNTY, FLA.

On request of the State health officer of Florida, Surg. J. A. Nydegger was detailed to determine the correctness of the diagnosis of trachoma made among the school children of Manatee County, Fla., by a representative of the State board of health.

An examination of a considerable number of the school children conducted during March 11-13, 1915, served to confirm the findings of the State board of health in regard to the nature of the existing affection, and the investigation was then extended to ascertain the prevalence and distribution of trachoma in all the schools then in session.

Trachoma was found in 18, or 70 per cent, of 25 schools inspected, 10 of these schools being urban and 8 rural. Seventy cases were observed among 1,684 children examined, or an infection rate of 4.04 per cent. Forty-nine of these cases were in urban schools, showing a prevalence of 5.7 per cent among 877 children examined, and 21 in rural schools, showing a prevalence of 8.57 per cent among 245 children of 7 schools. In the other four rural schools no cases of trachoma were found, although some suspicious cases were observed in one of the schools. Seventy-two cases "suspicious of trachoma" were also observed, 12 cases of follicular conjunctivitis, and a large number of cases of blepharitis marginalis.

In various parts of the county about 50 persons other than school children were examined and three cases of trachoma found, two of many years' standing and the other in a child about 3 years of age.

While trachoma may have been brought into the county by new settlers, there was also evidence of its existence there for a number of years.

The recommendations made by Dr. Nydegger to the local authorities for the control of trachoma contemplated medical inspections of school children at regular intervals, exclusion of trachomatous cases from the schools, and free treatment of indigent cases.

Dr. Nydegger's complete report has been published as Supplement No. 25 to the Public Health Reports.

TYPHOID FEVER.

During the year the service has continued its systematic studies of typhoid fever. This has taken the form of epidemiologic surveys of local outbreaks when requested by the State authorities, advice in improving local methods of sewage disposal, object lessons in prevention as described in the review of the rural sanitation work, anti-typhoid vaccination of Government employees and beneficiaries of the service, and education lectures, bulletins, press notices, etc.

While for the United States as a whole the typhoid-fever rate has in all probability been reduced by 50 per cent within the last 40 years, this disease is still far more prevalent in this country than in European countries. In fact, in respect to typhoid-fever prevalence, this country is now where countries such as Germany and England were 30 years ago, or about a generation behind the times.

There is therefore evident need of improvement in this respect. The best way to bring this about is by obtaining local action in re-

gard to those deficiencies which in practically all the outbreaks investigated by the service have been found responsible for the prevalence of typhoid fever, namely: lack of sanitary disposal of sewage, safe water supply, control of the milk supply and handling of food-stuffs, reporting of communicable diseases, and organization of an efficient local health department.

TYPHOID FEVER IN HINDMAN, KY.

The State Board of Health of Kentucky having requested the detail of an officer to cooperate in investigating and controlling an outbreak of typhoid fever at Hindman, Ky., Asst. Epidemiologist F. E. Harrington was assigned to this duty. The investigation lasted from December 9 to December 21, 1914, and was conducted in cooperation with Dr. D. P. Curry, an inspector of the State board of health, the county health officer, and the physician of the settlement school in which most of the cases of the disease occurred.

On investigation it was found that an epidemic of typhoid fever had occurred at the Settlement School, Hindman, Ky., early in November, 1914, and continued until December 20, 1914. There were 53 persons affected with the disease, making a case rate of 42 per cent for the total population of the school. The periods of infection were from October 24 to November 8. Of the school children, only those living at the settlement contracted the disease. Forty-seven of the 101 developed typhoid, making a case rate of 46 per cent for the settlement children. There were 19 adults at the settlement, of whom 6 contracted the disease, making a case rate of 32 per cent for the adults. All but four of the cases were infected between October 24 and November 8. Two of the four later cases are believed to have contracted the infection from the primary cause, and the other two are considered contact cases. The inmates as far as possible were vaccinated to prevent further spread of the disease.

The water supply was from shallow wells, all but one of which were dug, poorly protected from contamination by surface drainage or ground seepage. The excreta were disposed of in deep privy pits, with the occasional use of sewerer water-closets. Milk and food supplies were produced for the most part on the grounds. Rainfall was always followed by an immediate rise in the water level in all wells. One death resulted from the disease. The disease was pretty evenly distributed as to age, sex, and occupation.

The infection which produced the outbreak probably came from some common factor operating quite generally. There seemed to be no factors common to all inmates of the settlement, except food and water, and by elimination the source of the infection was attributed to water—a conclusion borne out by facts, since the infection practically stopped when the drinking water was boiled. It was impossible to state definitely from what source the infection reached the water supply, but the water from all the wells showed pollution by the presence of *B. coli*. Privy-pit contamination with typhoid bacilli could have occurred at any time and thence transmitted to the sub-soil water-bearing strata.

The recommendations made for the control of the disease embraced the boiling of all drinking water, disinfection of the excreta

of all patients and suspects and the contents of privy pits and cess-pools, the construction of sanitary privies, and the cooking before use of all vegetables grown in possibly contaminated ground.

TYPHOID FEVER IN HENDERSON, KY.

At the request of the State Board of Health of Kentucky, Passed Asst. Surg. W. H. Frost was detailed to conduct, in cooperation with Dr. W. L. Heizer of that board, an investigation of the prevalence of typhoid fever in Henderson, a town with approximately 12,000 inhabitants. The investigation was continued from July 10 to July 14, 1914.

After an examination of such morbidity reports as were on file at the local health office and consultation with local physicians, information was obtained in regard to nearly 30 cases of typhoid fever which had occurred in the town since the beginning of the year. As a result of the investigation of 20 of these cases and a survey of the town, Drs. Heizer and Frost came to the conclusion that while the disease was not at the time epidemic, it constantly was exceedingly prevalent in the town, the local death rate from that disease being only surpassed by one Kentucky city. The chief causes of its prevalence were apparently the use of a polluted water supply, faulty sewage disposal, and inadequate prophylactic measures at the bedside of patients.

As emergency measures, the local authorities were advised to establish an emergency hypochlorite plant for the treatment of the public water supply, and the adoption of ordinances compelling sewer connection for residences in the sewered district, and the replacement of open privy vaults by sanitary privies. As permanent measures, recommendations were made for the securing of a safe water supply, the extension of the sewerage system to all parts of the city, and the organization of an efficient health department which could exercise the necessary supervision over the milk supply, sewage disposal, and prophylaxis of typhoid fever.

TYPHOID FEVER IN THE DECATURS, ALA.

In view of the considerable prevalence of typhoid fever in Decatur and New Decatur, Ala., and on request of the State and local health authorities, Passed Asst. Surg. Paul Preble was directed to study the causes of the alleged epidemic and make such recommendations as appeared necessary for its control. The investigation lasted from February 14 to February 26, 1915, and the following information was obtained:

Typhoid fever was prevalent in the two Decatur in epidemic form during January and February, 1915. A definite outbreak occurred, the first case being reported December 31, 1914. Eighty cases were reported and definitely diagnosed between that date and March 1. Other unrecognized cases are believed to have occurred.

Milk, foodstuffs, contact, flies, and other common causes were shown not to have been responsible for the outbreak. The public water supply was the only factor in common to 79 of the 80 cases reported.

Typhoid fever was extremely prevalent on the Tennessee watershed a short distance above Decatur. Surface privies permitted ex-

tensive soil pollution. Heavy rains on December 25 can easily be conceived to have washed into the river and conveyed to the Decatur intake sufficient infectious material to cause the outbreak.

A survey of the construction and actual operation of the Decatur filter plant, supported by the results of the bacteriological examinations of the filtered water made during a period of careful operation of the plant, warrants the statement that at no time could the filter plant have been relied upon to furnish a pure and hence safe supply.

In addition to the influence of serious defects in the construction and operation of the purification plant, the sanitary quality of the Decatur water supply was further affected by the practice of introducing raw untreated river water to the service mains at frequent intervals. With undoubtedly dangerous pollution entering the river above, the people of the Decatur were thus exposed to infection and the outbreak was the logical consequence.

Bacteriological examination on August 8, 1914, showed evidence of pollution at that time, but no steps were taken by the water company, the health authorities, or the citizens of the two Decatur to improve the quality of the water supply. Although the outbreak started December 31, no action was taken by the local authorities until February 11, when the boiling of all drinking water was advised.

The Tennessee River is not considered safe as a source for public water supplies unless the water is purified, no stream receiving any considerable amount of human sewage being safe for drinking purposes until it has been subjected to artificial purification.

Although the reporting of communicable diseases is required by State health laws, there were no records to show that these diseases have ever been reported to the local health authorities in Decatur.

The recommendations made by Dr. Preble to the local authorities for the permanent control of typhoid fever embraced in detail three points: (1) Improvement of the public water supply, (2) passage of local ordinances for the reporting of communicable diseases, proper disposal of sewage and other wastes, and sanitary control of the milk supply and handling of foodstuffs in general, and (3) organization of an efficient public health department.

The complete report of Dr. Preble's investigation has been published as Supplement No. 23 to the Public Health Reports.

TYPHOID FEVER IN FLORENCE, ALA.

In accordance with requests from the county health officer of Lauderdale County, Ala., and the State health officer of Alabama, Passed Asst. Surg. Paul Preble was detailed to make an investigation of the prevalence of typhoid fever in Florence, Ala., a town of about 6,800 inhabitants. While the morbidity and mortality records of Florence were admittedly incomplete, there had been undoubtedly an unusually high incidence of typhoid fever during the winter and spring of 1914-15. The investigation lasted from April 27 to April 30, 1915, and during it special attention was paid to the sewage disposal, milk and water supplies, and an epidemiological study of 16 cases of typhoid fever which had been reported to the city health officer between October 20, 1914, and April 16, 1915.

After reviewing the available information it seemed reasonable to conclude that the milk supply, foodstuffs, contact, and other usual causes of typhoid fever except water had not operated as probable

factors in the causation of these 16 cases. The water supply was the only factor common to all cases, and the seasonal occurrence of the cases seemed to point to its being a possible agent in the prevalence of the disease.

Bacteriological examinations of the water and a sanitary survey of the source of supply seemed to warrant the statement that the Florence water supply, obtained from a creek near the outer limits of the city, can not be considered safe for drinking purposes. While the pollution of this creek was unquestionably intermittent it was, however, inevitable and greatest following rainfalls.

The recommendations made by Dr. Preble for the prevention of typhoid fever in Florence embraced in the first place the immediate improvement of the public water supply by means of the installation of a temporary disinfection apparatus and the employment of a sanitary engineer to advise in regard to the most advantageous method for obtaining a permanent safe supply. Other recommendations emphasized the need of the installation of a sanitary sewerage system, the abolishment of all surface privies, sanitary supervision of the production and handling of milk, proper collection and disposal of manure and garbage, reporting of all cases of communicable diseases, bedside prophylaxis in all typhoid cases, and the organization of an efficient health department with a full-time health officer.

TYPHOID FEVER IN PRINCETON, N. J.

In response to a request of the authorities of Princeton University, New Jersey, Passed Asst. Surg. R. M. Grimm was directed to proceed to Princeton on November 24, 1914, for the purpose of assisting the chairman of the sanitary committee of the university to determine, if possible, the cause of a reported outbreak of typhoid fever.

It was found that during the week ending November 15 four cases of typhoid fever had developed in the student body, which numbered approximately 1,600 persons, while only one case had been reported from the town of Princeton during the month of October. An investigation conducted by the chairman of the sanitary committee had determined that the only common factor in the histories of the four cases was their having patronized three restaurants frequented by a large number of students. It was also found that during the athletic games in October the University grounds had been visited by thousands of persons, among whom many transient vendors of eatables were present, and that each of the four cases had been away from Princeton at times which made it possible to have the infection contracted elsewhere. The sanitary committee apparently had control of the situation, since no new cases had occurred for 12 days, and it was obvious that no epidemic was imminent. Prophylactic vaccination of the students against typhoid fever had been advised by the chairman of the sanitary committee of the university, and 200 doses of this preparation were furnished for this purpose from the Hygienic Laboratory.

TYPHOID FEVER IN PORTSMOUTH, OHIO.

In connection with the investigations of the Ohio River,¹ an intensive study of typhoid fever in Portsmouth, Ohio, begun in Octo-

¹ See p. 99.

ber, 1913, by Passed Asst. Surg. L. R. Thompson, was continued until October 1, 1914, by Dr. Thompson and Asst. Surg. M. H. Neill. During this period 283 cases of typhoid fever were reported in Portsmouth, and of these all except a few which could not be located were visited and investigated by Drs. Thompson and Neill. The investigation is of interest as affording statistical data, of the kind obtainable only through an intensive study, relative to the prevalence and distribution of typhoid fever in an Ohio River city taking its public water supply from the Ohio River without purification. Since the completion of this investigation a filtration plant has been installed at Portsmouth, and it is, of course, to be expected that the conditions obtaining during the investigation no longer exist in that city. It may also be anticipated that the few remaining Ohio River cities still using raw Ohio River water will improve their water supplies within a few years, and that opportunities for a study of such conditions as have existed in Portsmouth will become increasingly rare. The data which have been collected and compiled by Dr. Thompson and Dr. Neill are now being prepared for presentation in a separate report.

MIGRATION OF TUBERCULOUS PERSONS.

The investigations into the relation to the public health of the interstate migration of tuberculous persons, mentioned in the last annual report, were continued during the year.

Studies of this problem were conducted in the States of Arizona and Colorado by Passed Asst. Surg. A. J. Lanza for a period of eight months, beginning in April, 1914. The extent of the migration of consumptives was found by him to be almost entirely a matter of conjecture, owing to the large number who never figure in any sort of official statistics. The effects of travel upon the patients themselves ranged from practically none to a severe setback, depending upon their condition and the amount of comfort with which they traveled. It seemed to be the opinion of various charitable agencies that the number of indigent tuberculous was increasing yearly, or, at least, they gave more trouble than formerly.

The danger of the spread of infection by migratory consumptives on railroad trains is, in Dr. Lanza's opinion, probably inconsequential. While some hotels may act as spreaders of infection, according to their lack of cleanliness, cheap lodging houses present a much more serious danger in this direction. Another probable source of danger, especially to children, observed by Dr. Lanza, was in soda fountains frequented by advanced consumptives, where drinking utensils were not properly cleansed.

The conclusions reached by Dr. Lanza were to the effect that the migration of tuberculous patients into Arizona and Colorado had had some unfavorable results. The chief cause lies probably in defects in the laws which permit the indiscriminate transportation of diseased indigents and furnish no remedy to the States where these persons migrate.

The complete report of Dr. Lanza has been published in the Public Health Reports and issued as Reprint No. 283.

Other reports on similar investigations in North and South Carolina by Surg. A. D. Foster, southern California by Surg. P. M. Carrington, and New Mexico and Texas by Passed Asst. Surg. E. A. Sweet, have also been published in the Public Health Reports and issued as Reprints Nos. 265, 266, and 269.

RESULTS OF THE INVESTIGATIONS IN SEVEN STATES.

As a result of these investigations, which were carried on in the health resort towns of California, New Mexico, Arizona, Texas, Colorado, and North and South Carolina, a proper understanding of conditions obtaining in localities resorted to by the tuberculous has been arrived at. The purposes of these surveys, as outlined to the officers in charge of the work, were to determine as accurately as possible (1) the extent and direction of the migration, (2) the effect of the travel on the patients themselves, (3) the relation to health of fellow travelers and railroad employees, (4) the living conditions of tuberculous persons in their new residences, and (5) the bearing on the sanitary, social, and economic status of the communities resorted to by tuberculous persons.

Extent of migration.—From observations made by the officers engaged in the investigation it was found that on the whole the migration of the tuberculous as a class is increasing, although the percentage of deaths from tuberculosis occurring within a short period of arrival is lessening. This indicates that the educational propaganda to keep far advanced cases at home have been of benefit. In some localities, especially in North and South Carolina, certain resort towns, which formerly were frequented by the tuberculous, were found to harbor very few tuberculous, owing to the increase of tourist travel, which for economic reasons has received the encouragement of local interests, while the coming of the tuberculous has been discouraged.

Effect of migration on the tuberculous.—Ordinarily travel has a detrimental effect on the tuberculous, and in advanced stages may be dangerous. Dust, confinement, altitude, and parting from friends were found to be factors which brought about this effect. Before advising tuberculous patients in respect to change of climate physicians should accordingly take into account not only the stage of the disease, but the financial status of the patient and his disposition or ability to endure separation from family and friends. Physicians should ascertain also whether suitable accommodations are available and whether competent medical advice may be obtained in the locality to which the patient is to be sent for climatic treatment. Both of these factors are indispensable in the proper treatment of the disease.

Danger of infection to other travelers.—The danger of infection to other travelers and to employees of common carriers, while present in limited degree, is not very great.

Conditions under which the tuberculous live.—The conditions under which tuberculous persons live in the localities resorted to for change of climate, and the effects of these conditions on the progress of their disease depend very largely on the question of

finances, influenced by education and previous habits, and whether or not the patient has had and continues to have wise medical advice. Competent medical advice would retain in their home surroundings far-advanced and hopeless cases.

Economic effect of migration.—Whether the coming of the tuberculous has been of benefit to the localities under consideration is hardly considered a debatable question. The growth of cities has been favored, industries developed, and production encouraged by the invalid class. Consumptives are engaged in practically every occupation, and the business and professional life of many cities is carried on in large part by them.

Advisability of Federal control.—The question as to the advisability of the Government taking over the maintenance and care of indigent tuberculous persons who are not citizens of the State wherein they reside has of late years frequently presented itself. After careful consideration of the question it appears that while tuberculosis is the most widespread of any disease in our country and there is need for additional hospital facilities for the care and treatment of patients, it is believed that it is the duty of the several States rather than of the Federal Government to provide these facilities, and that the future policy regarding this matter is for Congress to determine. This latter would not apply, of course, to those who are now beneficiaries of the Government. In the interest of efficient administration and to protect the public health it would seem also that it should not apply to the regular personnel of the Government itself.

OCCUPATIONAL DISEASES AND INDUSTRIAL HYGIENE.

During the past fiscal year investigations of occupational diseases and the hygiene of workers have been carried on under the direction of Surg. J. W. Schereschewsky in accordance with plans formed for this work. The headquarters for these investigations were transferred at the end of the fiscal year from Washington, D. C., to Pittsburgh, Pa.

GARMENT WORKERS IN NEW YORK CITY.

The comprehensive investigation begun in the previous fiscal year of the health of garment workers and hygienic conditions in this industry was brought to a conclusion. The persons examined belong to the cloak and suit, and dress and waist industries in New York City, which employ 49,000 and 37,000 persons, respectively, or a total of 86,000 individuals.

The investigation, which was made at the request of the joint board of sanitary control in the cloak, suit, and skirt and the dress and waist industries, met with the approval of the unions of these industries, which assisted in disseminating information as to its scope and purposes. Special offices were occupied and equipped to perform the necessary examinations.

The investigation embraced a careful physical examination of over 3,000 persons, and collateral studies of the illumination in workshops,

effect upon the atmosphere of workrooms of the use of gas-heated irons, general sanitary conditions of workshops, and home environment of workers.

Physical examination.—One thousand females and a little over 2,000 males were examined. Practically all the males were workers in the cloak, suit, and skirt trades, while some 86 per cent of the females were engaged in the dress and waist trades. The type of physical examination made was thorough, 45 to 50 minutes being spent on each individual. Besides collecting certain social and economic data, observations were made as to height, weight, circumference of chest, abdominal circumference, vital capacity, strength of grip, evidence of protection by vaccination against smallpox, pelvic measurements (in females), the systolic and diastolic blood pressure, the pulse rate, and the percentage of hemoglobin. In addition, the present physical status was carefully gone into, due note being made of defects and diseases present. In males the urine was also examined for the presence of sugar and albumen, and in 259 instances blood specimens were obtained to be tested for the presence of syphilitic antibodies.

Defects and diseases of garment workers.—The incidence of defects and diseases was noted in the case of 3,086 workers (2,086 males and 1,000 females). As a result, there were recorded 13,457 defects and diseases of all kinds, of which 9,541 were in males and 3,916 in females. This gives an average of 4.36 defects and diseases to each individual. By reason of the practice of noting all defects and diseases many of these were of a minor character, interfering neither with health nor efficiency. On the other hand, many of them had a deleterious influence upon the subject.

The examination showed no vocational diseases peculiar to the garment worker. Nevertheless, it was evident that the effect of sedentary occupations, such as women's garment industries, was to intensify the bad effects upon health and efficiency of certain defects and diseases or to produce them in predisposed individuals. Tuberculosis was undoubtedly the most important disease among garment workers, 3.11 per cent of the males examined and 0.9 per cent of the females being found to be tuberculous. This is a rate of prevalence for males of nearly ten times that of soldiers in the United States Army. It may have been that the rate of prevalence was artificially somewhat increased because workers who suspected their condition, upon hearing of the investigation, presented themselves for examination in order to ascertain whether they were suffering from tuberculosis. On the other hand, in many instances, the subject was unaware of his condition, having been conscious only of gradual impairment of health.

Apart from tuberculosis, the most common defects and diseases among garment workers, in order of frequency for both sexes, were defective vision (69 per cent), faulty posture (50 per cent of males), chronic nose and throat affections (26.2 per cent), defective teeth (26 per cent) and pyorrhea (20 per cent), dysmenorrhea (females 20.2 per cent), hypertrophied tonsils (15.3 per cent), defective hearing (10 per cent), nervous affections (7.75 per cent).

In connection with the high percentage suffering from defective vision, only 11.5 per cent of those whose eyesight was subnormal wore glasses. But 2.35 per cent of those with defective vision had glasses fully correcting the defect; in 7.5 per cent the defect was partly corrected, and was not improved or made worse by the use of improper glasses in 1.67 per cent.

A faulty posture was extremely common among garment workers, especially males. The bad effects upon health of faulty postures are well known, as they predispose to pulmonary affections, including tuberculosis, hernia, displacement of the abdominal organs, digestive troubles, weak and flat feet, and constipation.

That the general condition of health of garment workers is by no means satisfactory is shown by the large number of those examined who had subjective complaints to make about the state of their health. About 70 per cent of all examined had such complaints, while only 30 per cent stated that they felt well. Pain of some kind was the most frequent complaint; digestive disturbances, such as dyspepsia and chronic constipation, came next. Some 10 per cent of the males and 25 per cent of the females complained of frequent headaches. Nine per cent of males and 4 per cent of females complained of weakness either general or of the extremities.

The investigation resulted in the making of recommendations to the joint board of sanitary control for the improvement of conditions under the board's jurisdiction. Stress was laid upon education as a means of improving the knowledge of personal hygiene on the part of the worker, the lack of which plays an important part in the causation of the defects and diseases noted in the examinations.

The complete report of this investigation has been published as Public Health Bulletin No. 71.

Hygienic conditions of illumination in shops of the women's garment industries.—In view of the fact that garment making involves the close and continuous use of the eyes, the hygienic conditions of illumination in such industries become of importance, especially in view of the high percentage of visual defects revealed by physical examinations in garment workers.

The conditions of illumination were studied in a group of 34 workshops containing 45 typical workrooms. All the shops visited utilized daylight illumination. In 23 per cent of the shops auxiliary artificial illumination at some working plane had to be habitually depended upon.

As garment making requires an illumination at least equal to that which should prevail in a well-lighted schoolroom, the minimum standard upon working planes was placed at 5 foot-candles in order to insure satisfactory working conditions. Taking this illumination as a standard, it was found that at a little over one-half the working planes at which photometric measurements were made the illumination failed to reach this standard. Generally speaking, machines received the best illumination, followed in order by finishing tables, pressing tables, buttonhole machines, cutting tables, and basting tables. In design departments, in which sample garments are made up, the illumination was found to be more satisfactory than in the

general shop, thus showing that shop owners recognized the necessity of adequate illumination for the execution of careful work.

With a view to improving illuminating conditions in these shops recommendations were made to the joint board of sanitary control of the cloak, suit, and skirt and dress and waist trades. These recommendations are published in Public Health Bulletin No. 71.

Chemical composition of the air of workshops in the women's garment industries.—In view of the extensive use of gas-heated pressing irons in the workshops of the women's garment industries, with the resulting possibility of the contamination of the air with poisonous amounts of carbon monoxide, careful studies of the composition of the air of a number of shops were made. A comprehensive study of the permeability to gas of the various kinds of gas hose upon the market was also undertaken, and studies were also made of the composition of the combustion products of gas-heated pressing irons. This work is now nearly completed and a full report will appear in the near future.

The combustion products of certain makes of gas-heated pressing irons were found to contain a considerable proportion of carbon monoxide, some of the analyses giving as high as 2 per cent of this gas. It is needless to say that the use of such irons in closely confined surroundings may readily produce symptoms of poisoning.

ILLUMINATION STUDIES IN GOVERNMENTAL DEPARTMENTS.

In conformity with the plan of the service to make a comprehensive investigation of the hygiene of illumination, studies were commenced in Washington, D. C., in the Federal buildings. During the spring a photometric survey was undertaken of the Treasury Building which has just been completed. In this survey rooms typical of every lighting condition in the building were photometrically surveyed and the relation of the illumination to the kind of work done studied. Besides studying the amount, character, and distribution of the illumination, studies are also being made of the vision of employees in the department. The employees have been classified according to the kind of eye work they perform, and data are being collected of the state of their vision in relation to their occupation.

Laboratory studies of the physiology of vision.—In addition to the field work just mentioned, arrangements are being made for the conduct of laboratory studies of the action of light upon the eye. These studies will have for their object the adaptive function of the eye with relation to light of various wave lengths, the effects of infra-red radiation upon the eye, the effects of ultra-violet radiation, the cumulative effects of radiation, and other problems.

TUBERCULOSIS IN RELATION TO INDUSTRIES.

The study of tuberculosis in relation to the industries in Cincinnati, begun in March, 1914, was continued throughout the fiscal year 1915, under the direction of Surg. D. E. Robinson.

The following table gives the results of the examinations of employees made during the year:

Industry.	Number examined.			Number cases tuberculosis.			Number below standard for occupation.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
Art glass.....	17	0	17	0	0	0	0	0	0
Bakers.....	58	0	58	0	0	0	0	0	0
Boot and shoe.....	1,378	831	2,209	20	16	36	40	12	52
Brass and copper.....	1,076	80	1,156	9	0	9	25	0	25
Brewery.....	204	0	204	4	0	4	4	0	4
Broom.....	14	0	14	0	0	0	0	0	0
Carriage and wagon.....	104	9	113	1	0	1	4	0	4
Clothing.....	332	1,179	1,511	5	21	26	7	30	37
Confectionery.....	116	236	352	1	1	2	0	6	6
Cotton belts and ropes.....	23	35	58	1	2	3	1	0	1
Electrotype.....	118	0	118	1	0	1	2	0	2
Fertilizer.....	66	0	66	1	0	1	0	0	0
Foundry and machine shop.....	1,683	0	1,683	18	0	18	34	0	34
Furniture.....	145	0	145	1	0	1	3	0	3
Harness and saddles.....	57	0	57	3	0	3	1	0	1
Inks.....	41	0	41	0	0	0	1	0	1
Laundry.....	51	148	199	0	4	4	1	0	1
Leather.....	197	0	197	3	0	3	0	0	0
Lithographing.....	267	99	366	0	0	0	8	0	8
Molding and framing.....	57	3	60	0	0	0	4	0	4
Paper box.....	39	209	248	0	0	0	2	8	10
Piano.....	570	94	664	5	2	7	11	3	14
Playing card.....	354	501	855	2	1	3	9	10	19
Printing and publishing.....	677	292	969	2	2	4	9	5	14
Restaurant.....	71	23	94	3	0	3	6	3	9
Sand blast.....	18	13	31	0	0	0	0	0	0
Seeds.....	25	2	27	0	0	0	0	1	1
Slaughtering and packing.....	295	25	320	2	6	2	7	0	7
Soap.....	96	193	289	3	3	6	2	3	5
Stone and clay.....	244	1	245	8	0	8	5	0	5
Tin and sheet iron.....	450	115	565	10	2	12	12	4	16
Tobacco.....	243	342	585	1	2	3	2	7	9
Wood products.....	254	19	273	7	0	7	14	0	14
Total.....	9,340	4,449	13,789	111	56	167	214	92	306

The study was not limited to the industries alone, but was extended into other fields in an attempt to determine the most important causes predisposing to the high mortality from tuberculosis. The study included a survey of 138 families in which the board of health records showed there had been a case of tuberculosis, with a view to determining living and economic conditions and, if possible, the most common predisposing causes.

A study was also made of the cases of tuberculosis under treatment at the municipal tuberculosis hospital with the same end in view.

Studies were also prosecuted to determine the influence of climatic conditions, floods, population elements, immigration, and growth upon the tuberculosis death rate. The results of the above-mentioned studies, as well as the details of the investigation of tuberculosis in relation to the industries, will form the subject matter of a separate and more complete report.

Tuberculosis among prostitutes.—An examination for tuberculosis was made of the women in the segregated district of Cincinnati, 68 houses being visited and 317 inmates examined, of whom 27 were found presenting evidences of tuberculosis, 3 being open cases.

MINE SANITATION STUDIES.

Investigations of the occupational diseases connected with the mining industry and of mine sanitation, begun in 1914 in cooperation with the United States Bureau of Mines, were continued during the last fiscal year.

Attention having been directed to the prevalence of pulmonary diseases among the zinc miners of Jasper County, Mo., Passed Asst. Surg. A. J. Lanza was directed to make an investigation of sanitary conditions in relation to the zinc-mining industry in the Joplin district. A preliminary report by Dr. Lanza and Mr. Higgins, mining engineer of the Bureau of Mines, was made in December, 1914. Sanitary investigations of the mines were made with extensive sampling of air in underground workings for the purpose of determining the nature and amount of dust in suspension in working places. Physical examinations of miners were also made and vital statistics compiled from all available data. The report based on these studies was to the effect that pulmonary tuberculosis and silicosis were extremely prevalent among the miners of the Joplin district, the main etiological factor being a peculiar flinty rock dust with high silica content (95 per cent and more) found in what are known locally as "sheet-ground" mines. Other conditions favoring pulmonary disease were overwork, insanitary drinking devices in the mines, and unhygienic living conditions. It was also found that much, if not most, of the dust in the mines was unnecessary and due to carelessness or lack of knowledge of the harmfulness of dust on the part of miners and mine operators.

This investigation was resumed along broader lines in February, 1915, and is still being carried on. An educational campaign was inaugurated on tuberculosis, its nature and the important relation it bears, locally, to flint dust. Lectures were delivered, illustrated by lantern slides showing magnified particles of stone dust and by moving-picture films. Many of the mines were visited and short talks delivered to the miners during the noonday dinner hour, and every effort was made to arouse them to the dangers of dust breathing and the necessity of their cooperation in mitigating dust conditions.

Among the mine operators there was organized a sanitation and safety association for the purpose of promoting cooperation in the betterment of working conditions and instituting reforms, as far as practicable, in those methods of work that cause dust. This organization is active and thriving.

The State legislature, on the recommendation of the State mine inspectors, passed laws providing for the sprinkling of metal mines, prohibiting certain practices in mines that tend to cause dust, prohibiting common drinking devices underground, and providing for clean and adequate change houses.

This investigation is being pursued for the purpose of determining the actual relationship of silicosis to tuberculosis. The connection between industrial dust diseases and tuberculosis is becoming more and more apparent and offers a wide field for both investigation and reform. During April, 1915, the Public Health Service opened an office in Webb City, Mo., in the heart of the zinc mining district, for

the physical examination of miners and the collection of statistics relative to the spread of infection among their families. Up to June 30 over 350 miners had been examined, more than half of whom showed definite signs of pulmonary disease. Sputum examinations are made whenever possible and a series of X-ray plates taken, which throw considerable light on the extent of dust injury to the lungs in these cases. This work will be concluded during the next fiscal year and a report made on these data, together with the protocols of cases.

STUDIES OF SANITATION OF STEEL PLANTS.

The investigation by Asst. Surg. J. A. Watkins of existing sanitary conditions in the metallurgical plants of the Pittsburgh district, referred to in the last annual report (p. 52), has been continued during the year.

To date investigations have been made in a number of plants employing approximately 34,000 men. The characteristics of the industry have been studied and an endeavor made to determine the mutual attitude between employers and employees. The steel workers have been studied as a class, and information relative to the age and race composition of the force, the food eaten, and the clothing worn in the mill has been collected and observations made on such personal habits as might affect health, particularly with reference to avoiding the health hazards incident to the occupation.

A survey of the steel works was made, which included the general sanitary condition of the plant, the character of the work, the amount required, and the conditions under which it was performed. The sanitary survey of the plant included the following: Drinking water; sewage and waste disposal; toilet facilities; bathing and washing conveniences; wash, change, and locker rooms; rest and lunch rooms. The character of the work was observed in order to determine whether it was of such nature as adversely to affect health.

The amount of work performed by these men was gone into in detail, the information collected being the total hours of duty per week and per turn, and in order to determine accurately the actual amount of physical exertion required, each occupation was studied separately. The total time on duty was divided into that time spent at physical exertion, at rest, and active, and a large number of stop-watch readings taken to determine what percentage of the total time on duty each constituted. The conditions under which the work is performed received special attention, the following subjects being investigated: Buildings, space, flooring, speeding-up and monotony, industrial lights, noise, vibration, working positions, illumination, suspended matter in the air, harmful gases, ventilation, temperature, and humidity. The temperature and humidity to which the steel workers are exposed was gone into in detail, several thousand psychrometric readings being taken. The length of each exposure was determined by a stop watch; the number of exposures on one turn determined and observations made at the time as to the character and amount of physical exertion required of the men while so exposed.

Before drawing conclusions as to what effect the employment or the environments alone had upon the health of the steel workers it was

considered necessary to determine to what extent the home environment and the habits of these men outside the mill affected their health. Accordingly, a general survey of the residential sections of five mill towns and a detailed study of two typical mill towns were made. Data were collected relative to the following subjects: Water supply, sewage and waste disposal, public health administration, morbidity and mortality reports, hospitals and physicians, housing conditions, and habits of the steel workers while off duty, particular attention being given the saloon.

In the course of the investigation a study was made of each condition that might adversely affect the health of the employees. The officials of the plants offered every convenience and their cooperation was very valuable. Dr. Watkins, when requested, gave advice on sanitary matters and suggested ways and means of altering certain conditions for the mutual benefit of employers and employees. It is planned to supplement the data and information so far collected with data relative to the physical condition of the steel workers. Finally, reports of practical use to steel workers will be prepared for disposition by the Bureau of Mines, in cooperation with which the studies are being made.

COOPERATION WITH THE COMMISSION ON INDUSTRIAL RELATIONS.

Surg. B. S. Warren continued on duty with the Commission on Industrial Relations as sanitary adviser until July 1, 1915, and has submitted to the commission a final report on "Sickness insurance" and its relation to the prevention and cure of disease among industrial workers and, also, a final report on "Economic conditions and their relation to the public health."

Sickness insurance.—The final report on this subject was a joint report by Surg. Warren and Mr. Edgar Sydenstricker, a member of the commission's staff of special investigators. This report was not final in the sense that the study of the subject was considered complete, but final in the sense that it was as complete as the money available for the work would permit. The investigations were sufficiently extensive and intensive to show that sickness insurance had been in operation in many European countries long enough to prove its usefulness. Furthermore, the experience in this country was found to show a great demand for it, and to show that practically all of the essential features were in operation in some of the labor unions, business establishments, fraternal orders, or commercial insurance. But there was found to be great need for governmental supervision to the end that uniformity would be brought about and sickness insurance given national application.

The report includes a consideration of the problem of the wage-earners' health, the conditions underlying this problem, the adequacy of sickness insurance as a remedy, as well as a plan for the basis of a National or State law on the subject.

The subject of sickness insurance in relation to public health will be further studied in detail and a report of the findings published.

The problem of the wage earners' health.—The problem of sickness among wage earners is so closely related to economic conditions

that a study of the one can not leave out of consideration the other. Provision for medical relief of the sick wage earners is so often useless without provision for financial relief, because so many of them can not afford to stop work to avail themselves of medical relief before it is too late. It is not until these economic conditions are considered in their relations to sickness, both as cause and effect, that the magnitude of the problem can be realized.

The inability of the average wage earner to meet the expense of medical treatment is pointed out by the fact that more than half of them are receiving incomes barely sufficient to meet the average family expenditures without a reasonable chance to save for sickness when it comes. The relation of poverty and disease is further shown by the fact that the death ratio in the poorest sections of cities is often double that of the best sections, that the death rate of infants of fathers earning less than \$10 per week in various cities is often three times that of the infants of fathers earning \$1,200 or more per year, that the tuberculosis rate is roughly in inverse ratio to the income, that over 11 per cent of all unemployment is due to sickness, and that nearly 40 per cent of cases requiring relief give sickness as a cause.

Economic conditions and their relation to the public health.—In his report on this subject, submitted by Surg. Warren to the Commission on Industrial Relations, it was shown how intimately the problem of disease prevention was related to industrial and economic problems and the necessity for cooperation between public-health workers and those endeavoring to solve our economic problems.

Hygienic standards were defined and outlined according to responsibility. The most important of these were discussed in order to show the relation of insanitary conditions in places of employment, long hours of labor and fatigue, poor living conditions, cost of living, wages and income, and woman and child labor, to the health of the individual worker and the community. This was especially shown by the sick and death rates according to occupation and their effect upon the infant mortality. The relation of sickness to labor unrest was pointed out.

Sanitary surveys of certain industries.—At the request of the Commission on Industrial Relations four officers were detailed during the year to make brief sanitary surveys of certain industries, in order to obtain information regarding working conditions, influences detrimental to the health of workers, and whether or not such influences were a necessary concomitant of the industries surveyed. Among the industries studied were the following: Boot and shoe manufacturing, at Brockton, Mass.; writing-paper industry, at Holyoke, Mass.; silk manufacturing and dyeing, at Paterson, N. J.; bituminous-coal mining, at Shenandoah, Pa.; glass manufacturing, at Charleroi, Pa.; steel industries, at Johnstown, Pa.; copper mining, at various localities in Michigan; the manufacture of rubber tires and rubber goods, at Akron, Ohio; iron-ore mining, at Hibbing, Minn.; and the manufacture of agricultural implements, at Moline, Ill.

Upon completion of the surveys the Industrial Commission was furnished with the information collected.

STUDIES OF CHILD-LABOR PROBLEMS IN MASSACHUSETTS IN RELATION TO HEALTH.

In January of this year the Massachusetts State Board of Labor and Industries requested that Asst. Surg. M. V. Safford should be authorized to assist the board in the problems which confronted it with respect to the employment of child labor in the State, and he was accordingly detailed with the board under instructions contemplating a study of the effect of various occupations on persons during their period of adolescence.

By recent State legislation the administration of practically all laws and regulations relating to the conduct of industries and the employment of labor in Massachusetts has been placed in the hands of this board, together with complete jurisdiction in matters of industrial hygiene, which were formerly under the State board of health or the district police. As the medical work of the State board of labor and industries had not been fully organized, it was not until May that actual investigations in the direction of the study contemplated in Dr. Safford's instructions began. There were then undertaken under his direction comprehensive physical examinations of minors employed in the textile industries of the State in accordance with a prescribed scheme of examination calculated to bring out and record any abnormal conditions in the persons examined possibly attributable to the individual's particular occupation or working conditions. In addition to actual physical examinations of employees there have been made available for purposes of study case records of the hospitals of Lowell and Lawrence, to which practically the entire mill population of these cities resort in sickness or accident for either dispensary or hospital treatment.

This investigation of the textile industry is still in progress. It has been subject to interruptions by reason of the fact that Dr. Safford is also in charge of the immigration work of the service at Boston and because of temporary reduction of the medical staff at the station.

While sufficient data has not yet been accumulated to warrant positive deductions as to the effect or noneffect of the various kinds of work in the textile industry upon minors employed therein, enough has been done to make a prediction as to conclusions fairly safe in certain matters of practical interest.

An undue proportion of the boys employed have, for instance, been found to be under height and weight for the ages given, but such deficiencies have been found to bear no relation to the duration of employment in the textile industry. To some extent such deficiencies are more apparent than real and are to be accounted for by successful evasion of the State laws with respect to the age and hours of employment of minors. The same thing is apparent, however, in groups of boys whose ages would not seem open to question and would appear to be accounted for by the fact that mill work is chiefly a "woman's work" and is likely to attract males who by reason of lack of physical strength or other cause are ill-fitted to do anything else, or, in other words, that in an investigation of this sort in the textile industry one is dealing to a great extent with material that was pathological from the start.

An attempt was made to carry on in conjunction with the physical examination some systematic tests of mental capacity similar to those used in the preliminary mental examinations of arriving aliens, but it was found impracticable to combine the two procedures. Record is still being made, nevertheless, of suspicions of lack of normal mental capacity which have been brought out in the course of the physical examinations, and if such cases were to be followed up it is believed that some of them would prove to be instances of clearly demonstrable mental defectiveness. On the whole, however, considering that much of the work of mill employees calls for no greater degree of intelligence than of physical strength, there would not appear to have been found thus far a surprising proportion of persons deficient in one or both of these respects.

MENTAL TESTS OF FACTORY CHILDREN IN MARYLAND.

At the request of the chief of the Maryland Bureau of Statistics and Information, Surg. J. A. Nydegger was instructed to render such assistance as might be practicable in regard to making tests of the mental development of children employed in factories, especially in connection with the enforcement of child-labor laws. In a number of cases this was done from time to time during the year by Dr. Nydegger.

SANITATION OF CONVICT CAMPS.

At the request of the Director of the Office of Public Roads, United States Department of Agriculture, Passed Asst. Surg. W. F. Draper was detailed on August 17, 1914, to conduct an investigation of the sanitary conditions of convict road-construction camps in the United States and the health of the convicts therein.

The purpose of the investigation was to determine by close observation the actual conditions which exist in convict camps, and with the knowledge thus gained, to make whatever recommendations might be necessary for the improvement of sanitary conditions and of the health of the convicts, and to prepare plans and specifications for a model camp.

Convict road camps were inspected in the States of Alabama, Arizona, Colorado, Florida, Georgia, Michigan, New Jersey, New Mexico, New York, North Carolina, South Carolina, Texas, Utah, Virginia, Washington, and Wyoming. Housing, water supplies, disposal of sewage and other wastes, feeding, working conditions, and health of the inmates were thoroughly investigated at each camp. Many camps were found to be in good sanitary condition, but others were in a most deplorable state.

A report of the sanitary and health conditions observed in the various camps has been prepared by Dr. Draper, with definite recommendations in regard to the sanitary principles which should govern these institutions.

It is intended to continue studies of the sanitation of industrial camps generally, with the view to the preparation of a comprehensive report on the subject.

MECHANICAL DEVICES AS AIDS TO RESPIRATION.

From time to time, at the request of the General Superintendent of the Life-Saving Service (now consolidated with the Revenue-Cutter Service into the United States Coast Guard), investigations have been made by this service of certain mechanical devices recommended for the resuscitation of apparently drowned persons. A request from the same official was received in January, 1915, that tests be conducted of an apparatus called "lung motor" to determine its merits for use in resuscitating the apparently drowned.

The investigations of the apparatus were conducted at the Hygienic Laboratory by Surg. J. W. Schereschewsky and Technical Assistant G. B. Roth from May to July, 1915, when a report was rendered. It was in substance the opinion of the investigators that, while manual methods of resuscitation should be primarily relied on and can not be dispensed with by any mechanical device thus far known, mechanical means for producing artificial respiration should be available in places where accidents may occur from drowning or exposure to poisonous gases. Mechanical methods of respiration are especially indicated in cases of great relaxation, collapse of the lungs, and gas poisoning, and also when signs of reanimation fail to appear shortly after the application of manual methods.

While, in so far as actual ventilation of the lungs is concerned, mechanical methods are superior to manual, it was the opinion of the investigators that the delay incident to the application of mechanical methods at a time when every second is of value constituted a serious argument in favor of manual methods. They therefore recommended that in all cases of submersion or exposure to poisonous gases manual methods should be applied without delay and let the use of mechanical respiration be decided by the condition of the subject.

As a device for mechanical respiration in appropriate cases, the investigators concluded that the lung motor is a satisfactory device provided the suction stroke is not used. They were in accord with the committee on resuscitation from mine gases, who, in their report to the United States Bureau of Mines, condemned expiration produced by repeated suction of air from the lungs. It was recognized that the lung motor may be used as a device for producing inspiration only, the suction stroke being dispensed with. In this case the apparatus should be provided with a release valve, which will allow air to escape outside whenever inspiratory pressure reaches a maximum of, say, 20 millimeters of mercury. Used in this manner and by persons having the requisite skill and experience the investigators were of the opinion that an apparatus similar to the lung motor would be free from danger and in suitable cases have a field of usefulness.

PUBLIC HEALTH ORGANIZATION AND ADMINISTRATION.

For a number of years the service has been emphasizing the fact that the strengthening of State and local health organization is one of the great needs of the Nation. It is with a view to disclosing how this may best be accomplished and advocating remedial legis-

lation that analyses of the laws in force have been made and investigations of State and local public health administration conducted in various States and communities at the request of the authorities concerned.

HEALTH ORGANIZATION IN MINNESOTA.

On request of the State Board of Health of Minnesota Surg. Carroll Fox was detailed to conduct a study of public health activities and needs in that State. The investigation continued for a period of about three months from June 4, 1914, embracing the following matters: Organization of the board; executive officers; divisions of the board and their duties and facilities; control of preventable diseases; control of water supplies; disposal of sewage and other municipal wastes; sanitary regulation of public institutions, lodging houses, etc.; control of milk supply; registration of vital statistics; educational functions, literature, lectures, and exhibits; school hygiene and child welfare; field work; local health organization; appropriations available for health work; and health activities carried on by other agencies.

As a result of his studies Dr. Fox was able to formulate a number of recommendations in regard to changes deemed necessary to secure in Minnesota that efficiency in protection against disease to which its citizens are entitled.

The complete report of Dr. Fox's investigation, with his recommendations, has been published in the Public Health Reports and issued as Reprint No. 223.

HEALTH ORGANIZATION IN WASHINGTON.

Following the Minnesota investigation Surg. Carroll Fox was directed, at the request of the State Board of Health of Washington, to conduct a similar study in that State. This study lasted from September 17, 1914, to January 13, 1915, and was carried on along lines similar to those followed in Minnesota.

As a result of his study Dr. Fox concluded that the adoption and enforcement of measures for the protection of the public health in the State of Washington had not kept pace with the growth in population and wealth of the State, and that coordination of health activities scattered among different branches of the government and providing the necessary legislation and funds for health work were imperative. These conclusions were embodied by him in a series of detailed recommendations.

The complete report of this investigation has been published in the Public Health Reports and issued as Reprint No. 255.

HEALTH ORGANIZATION IN WEST VIRGINIA.

In accordance with requests from the governor and the State Board of Health of West Virginia Surg. Taliaferro Clark was detailed on November 4, 1914, to make a study of public-health organization and administration in that State. The undue prevalence of such diseases as typhoid fever and trachoma in West Virginia, and the expressed desire of the authorities of the State for the improvement of

existing conditions made this study of special interest, in view of the possibility that legislation would be adopted to provide better protection for the public health.

In his investigation Dr. Clark considered especially the provisions governing State and local health organization, control of communicable diseases, regulation of the practice of medicine, registration of vital statistics, pollution of water supplies, control of nuisances, sanitary control of foods and drugs, hotel inspection, school hygiene, industrial hygiene, etc.

The conclusion reached was that both State and local public-health administration in West Virginia was in evident need of reorganization and strengthening by means of legislation supplying the necessary additional powers and adequate funds to carry on health work. Specific recommendations in regard to measures were made by Dr. Clark in his report of the investigation. This report has been published in the Public Health Reports and issued as Reprint No. 252.

Legislation embodying most of Dr. Clark's recommendations was subsequently enacted in West Virginia. While this law has some excellent features, one obvious defect was its failure to provide the minimum amount of funds which are, in the opinion of this bureau, required to perform effective public-health work.

HEALTH REORGANIZATION IN ILLINOIS.

On requests from the efficiency and economy committee of the General Assembly of the State of Illinois and the State Board of Health of Illinois Surg. S. B. Grubbs was detailed to make a study of the Illinois health agencies. This study covered a period of over three months from November 9, 1914, and embraced not only the work of the State and local boards of health, but also the sanitary functions of other departments, such as the State board of pharmacy, the board of dental examiners, the State barbers' examining board, the State food commissioner, the State department of factory inspection, the Illinois Rivers and Lakes Commission, the State water survey, State charities commission, and such unofficial sanitary agencies as the association for the prevention of tuberculosis.

As a result of this study, the conclusion was reached that the present State board of health is primarily a licensing board, with insufficiently developed public-health functions, and that many duties that should devolve upon it have been either assumed by other agencies or left unattended. A reorganization to remedy this fault is therefore desirable, and new legislation enacted to strengthen the authority of the State in discharging sanitary responsibilities already recognized and performing other work so far neglected. One obvious need is the grouping of related health functions of the State into one State department of health.

The specific improvements deemed necessary were enumerated in detail by Dr. Grubbs in the report submitted by him to the efficiency and economy committee. While the majority of these changes, and these the most important, required new legislation, in a number of administrative matters the recommendations made could be immediately carried out and were adopted; in fact many of these changes had been recognized as desirable by the executive office of the State board of health before the recommendations were made.

The complete report of Dr. Grubbs's investigation has been published in the Public Health Reports and issued as Reprint No. 275.

HEALTH ADMINISTRATION IN KANSAS.

On request from the public health commission appointed by the governor of Kansas and the Kansas State Board of Health, Asst. Surg. Gen. J. W. Kerr was directed on November 3, 1914, to proceed to that State to confer with the authorities mentioned in regard to the public-health organization and administration of the State.

A study of the activities of the State and local boards of health showed that Kansas has a rather well-planned State health organization. While some parts of it are as yet undeveloped and other parts only partially developed, the amount of work accomplished by the State board is large, considering its limited facilities.

As a result of the conferences held and observations made, the conclusions were reached: (1) That, from a public-health standpoint, the greatest need of the State of Kansas is an efficient field organization composed of full-time health executives, (2) that local units of health administration should be made sufficiently large to justify the employment of full-time health officers, (3) that adequate funds should be available for use of health authorities in preventing disease and an emergency fund placed at the disposal of the State health authorities for the suppression of epidemics.

In cooperation with the officers of the public health commission and the State board of health, a proposed measure was examined providing in substance for the division of the State into not more than 30 sanitary districts, consisting of one or more counties, constituting the county and city authorities in each district into district boards of health, and requiring in each district the appointment after competitive examination of a full-time health officer with a compensation of not less than \$2,000 per annum.

STUDY OF THE CHICAGO HEALTH DEPARTMENT.

At the request of the efficiency commission of the Chicago Civil Service Commission, the service undertook a study of the organization and administration of the health department of the city of Chicago. Senior Surg. J. C. Perry was detailed for this investigation, and his work, which commenced on December 2, 1914, was continued for four months, for the purpose of making recommendations in regard to improvements deemed advisable.

Among the features of the system which Dr. Perry commended were the organization of the bureaus, the membership of the health commissioner on unofficial health bodies, the particular stress laid on educational work in fostering improvements in living conditions, the school of sanitary instruction for employees of the department with its facilities for others interested, the probationary period of six months for new employees, the employment of full-time supervisors in the bureau of medical inspection to check up work performed by health and quarantine officers and similar methods in other bureaus, the supervision over the public bath system and public lodging houses, and the means of dealing with communicable diseases, especially tuberculosis.

Most of the changes suggested by the investigator were individually of minor importance but cumulative in effect. He found that the city was backward in providing funds for infant welfare service, that the dental dispensaries were insufficient, that there was lack of uniformity in the scoring of dairy farms and unsatisfactory arrangements for the transportation of milk to the city, that in some bureaus additional men were needed to carry out necessary work, and that in others some changes in routine would improve the service rendered. It was found that the municipal garbage plant had not been in operation long enough for a statement as to its real efficiency.

At the completion of the investigation the mayor of the city of Chicago sent a communication expressing appreciation of the work of Dr. Perry and stating his belief that the investigation would be of lasting benefit.

A complete report of the results of this study has been published in the Public Health Reports and issued as Reprint No. 300.

PUBLIC HEALTH ADMINISTRATION IN TOLEDO.

A study of the health organization and administration in the city of Toledo, Ohio, was made by the service at the request of the Ohio State Board of Health, the Toledo Board of Health, and the Toledo Commerce Club. Surg. Carroll Fox was designated for this work, and his investigation, carried on for a period of about four months, from January 21 to May 8, 1915, included a study both of the office and field work of the city department of health.

At the present time health affairs in Toledo are administered by a board of health the members of which receive no salary. A health officer is appointed by the board; but on January 1, 1916, a radical change is to be made in the health organization as the result of a new charter. Under this charter the division of health is made a subdivision of the department of public welfare and authority to make regulations is vested in the council. The management of municipal hospitals is placed in a division of the department of public welfare, known as the division of charities and corrections, and is not under the health division. As a result the division of health will virtually become a body for the correction of nuisances. The most important recommendation of Surg. Fox was that the health division be made a regular department of the city and include under it the division of charities and corrections and also the supervision of the health of school children, now under the board of education.

The investigator found that the city of Toledo, like other Ohio cities, is limited in resources owing to a State law which limits city revenues to a 10-mill tax levy to provide for its ordinary maintenance as well as to assume its share in the support of the State and county governments. He, nevertheless, suggested that a larger percentage of the funds be devoted to health work and recommended that the minimum amount allowed be not less than 15 per cent of the city's available revenues. This would be for the year 1915, \$292,505. Two-thirds of this sum, he believed, should go to the department of service for the collection of garbage and rubbish, street cleaning, and comfort stations.

Among the other recommendations made by the investigator were that the health officer be required to devote his full time to his duties and be paid a salary equivalent to that received by other department heads; that a better supervision be maintained over the milk supply of the city and all market milk pasteurized; that all catchbasins, privy vaults, and surface wells within the city be abolished; that the practice of emptying sewage into creeks be discontinued; and that the educational work of the department be extended.

Despite the misconception of the duties of a health department by the framers of the new charter, Dr. Fox reports that the recently appointed health officer, with the support of the board of health, the newspapers, and many citizens, has already attempted a reorganization in accordance with the foregoing suggestions.

A report of this investigation has been published as Reprint No. 284 of the Public Health Reports.

SANITARY SURVEY OF RICHMOND, IND., WITH SPECIAL REFERENCE TO TUBERCULOSIS.

On request of the State and local health authorities, Asst. Surg. Gen. L. E. Cofer was directed on March 31, 1915, to make a study of the tuberculosis situation at Richmond, Ind., and formulate such preliminary recommendations as might seem advisable.

In the somewhat limited time at Dr. Cofer's disposal, an examination of the available data seemed to indicate that in those sections of Richmond occupied respectively by the wealthy and the poorer classes there was very little tuberculosis, the disease being apparently confined to the localities where people of moderate means resided, and that a careful and prolonged survey would be necessary before the causes responsible for the prevalence and distribution of tuberculosis in Richmond could be determined and corrective measures applied. Accordingly, on request of the State and local health authorities, Senior Surg. J. C. Perry was detailed on May 21, 1915, to conduct an investigation of sanitary organization and administration in Richmond and advise the city authorities in regard to the measures which should be adopted to prevent the spread of communicable diseases, especially tuberculosis.

This investigation began on May 27 and was still in progress at the end of the fiscal year.

SANITARY SURVEY OF BOWLING GREEN, KY.

On request of the secretary of the State Board of Health of Kentucky, Passed Asst. Surg. W. H. Frost was directed on September 12, 1914, to make a sanitary survey of Bowling Green, Ky. The survey lasted from September 26 to October 1, 1914, and its chief object was to determine the causes responsible for the excessive prevalence of typhoid fever in Bowling Green and to recommend remedial measures.

The city is an important educational center, about 2,500 students attending its various colleges every year, and its population numbers over 9,000 inhabitants. A study of local sanitary conditions showed that, in spite of certain natural advantages, the death rate from

typhoid fever in Bowling Green for the years 1911, 1912, and 1913 has been over 99 per 100,000, this being the highest typhoid rate of any city in Kentucky, about twice the average typhoid death rate for the State, and four times as large as that of the "registration area" of the United States. That this was not a recent or temporary condition was demonstrated by the fact that for a period of 25 years, from 1886 to 1910, the average death rate from typhoid fever had been 62 per 100,000, with great variations from year to year.

In trying to account for this excessive death rate it was found that the public water supply was derived without adequate purification from a river subject at all times, and especially in rainy seasons, to sewage pollution, that the city had no proper system of sewage disposal, and that there was no properly equipped local department of health.

The public water supply and need for a sewage system had been reported upon in 1911 by Mr. Paul Hansen, former State sanitary engineer, who had pointed out the structural defects in the present water plant and indicated the necessary improvements in construction and methods of operation.

The most imminent danger to the city consisted in the entire absence of any system of sewage disposal, surface privies being in common use. Considerable time was spent in making an estimate of their number, character, care, and distribution, the conclusion being that one-third of the residences had water-closets most of which discharged into so-called "sinks"; that at least one-half of the residences having water-closets used privies also; and that every house not provided with a water-closet had a privy. Most of these privies were insanitary, the majority being in a filthy condition, with large accumulation of discharges. No municipal ordinance was in force regulating the construction, care, and cleaning of privies.

The measures which in Dr. Frost's opinion should be applied without delay for the prevention of typhoid fever in Bowling Green comprise the organization of an efficient department of health with a full-time health officer and the necessary assistants; the improvement of the water supply by more careful operation of the purification plant and preferably by structural changes; antityphoid inoculation of residents, and especially students; the regulation of privies, pending the construction of a sanitary sewerage system; and the immediate construction of a sanitary sewerage system, which was the most urgent need of the town.

Copies of the report of Dr. Frost's investigation, with the conclusions reached, were furnished to the secretary of the State Board of Health of Kentucky and the common council of the city of Bowling Green.¹

REQUIREMENTS OF HEALTH ADMINISTRATION.

So far systematic studies of public-health organization and administration have been made by the service in the States of Illinois, Kansas, Maryland, Massachusetts, Minnesota, Washington, and West Virginia, and the cities of Chicago, Ill., Baltimore, Md., Toledo, Ohio, St. Joseph, Mo., Richmond, Ind., and Bowling Green, Ky.

¹ See p. 115.

In addition exhaustive compilations and analyses have been made of the legislation relating to this subject.

The information thus obtained seems to justify the conclusion that the two greatest sanitary needs of the Nation at the present time are: (1) Employment of properly qualified, full-time health officers for every community; (2) appropriations sufficiently large to conduct efficient health work.

Full-time health officers.—In the recent past the principle of the employment of full-time health officers has been recognized in sanitary legislation enacted in the States of Maryland, Massachusetts, New York, North Carolina, and Wisconsin, and the island of Porto Rico. Bills of the same character have also been introduced in the legislatures of the States of Indiana and Kansas.

Adequate health appropriations.—Officers of the service have time and again expressed the opinion that at least 2 per cent of the public revenue should be spent for public-health work, since from no other expenditure is so much profit ultimately derived. The studies so far made give clear indication that a great deal of progress must be made before this desideratum can be reached. In most of the States the need is not for more health laws but for coordination of those already on the statute books, grouping of direct health functions under one executive officer, and adequate funds to enforce existing legislation.

A study made by the service in 1913 (see Public Health Bulletin No. 62) showed that only the District of Columbia, Florida, Hawaii, Nevada, Pennsylvania, and Porto Rico appropriated more than 10 cents per capita for health work, and Massachusetts, Montana, and Vermont more than 5 and less than 10 cents, while not less than 12 States were appropriating less than 1 cent per capita for the same purpose. A similar study shows at present the District of Columbia, Florida, Hawaii, Idaho, Nevada, Pennsylvania, and Porto Rico in the first of these classes, the States of California, Maryland, Massachusetts, Montana, New Jersey, and Vermont in the second, while the States of Arkansas, Iowa, Nebraska, New Hampshire, New Mexico, North Dakota, South Dakota, and Tennessee are still among those appropriating less than 1 cent per capita for health work.

Appropriations of more than \$100,000 a year for health work are being made at the present time only by the States of California, Florida, Illinois, Maryland, Massachusetts, New Jersey, New York, and Pennsylvania, and the District of Columbia, Hawaii, and Porto Rico.

Courses in public health.—An encouraging sign of the growing belief that public-health work must be performed by properly trained experts is the establishment of courses in public health in some of the most representative educational institutions of the country, as California University, Harvard University, Massachusetts Institute of Technology, and the Universities of Michigan, New York, Pennsylvania, and Wisconsin.

COOPERATION WITH FEDERAL AND STATE GOVERNMENTAL AGENCIES.

Following the practice in previous years, the facilities of the Hygienic Laboratory were extended to a few State and local officials for purposes of instruction. Reference is made subsequently to the

use of this laboratory as a means also of instructing the officers of the service.¹

The practice was followed also during the year of cooperating with a number of other governmental departments and bureaus in the conduct of investigations. Among these departments are the Indian Service, the Bureau of Mines, and the Office of Public Roads. Cooperation was also extended to the Hawaiian and Porto Rican health authorities and the authorities of certain States, including North Carolina.

COOPERATION WITH THE INDIAN SERVICE.

In a communication of September 19, 1914, the Department of the Interior inquired whether it would be possible for the Public Health Service to extend to the physicians in the Indian Service the facilities of its laboratories by making examinations of such specimens as might be submitted from time to time to aid in the diagnosis of communicable diseases. Arrangements have been made to have diagnostic examinations made for the physicians of the Indian Service at the following laboratories maintained by the Public Health Service: Hygienic Laboratory, Washington, D. C.; Seattle, Wash.; San Francisco, Cal.; Fort Stanton, N. Mex.; St. Louis, Mo.; New Orleans, La.; Chicago, Ill.

A number of examinations have been made of various specimens submitted by the Indian Service in accordance with the arrangement made.

COOPERATION WITH HAWAIIAN AUTHORITIES.

Several opportunities have been presented to cooperate with the Territorial health department under the assignment of Surg. G. W. McCoy as sanitary adviser to the governor of Hawaii.

Typhoid-fever studies.—The data in the possession of the board of health on typhoid fever on Oahu were examined critically, and while work in connection with this disease was not completed it seemed worth while to make recommendations to the board of health (1) to prevent cases being reported as "paratyphoid" unless the diagnosis is supported by the results of laboratory examination, and (2) to keep convalescent and recovered cases under the control of the board so long as bacilli were being eliminated.

Water examinations.—The sanitary engineer of the board of health, Mr. W. S. Tay, was aided in carrying out a number of bacteriological examinations of water.

Soda-water plant investigations.—In connection with Mr. A. W. Hansen, Territorial food commissioner, the sanitation of soda-water plants was given attention. The cleansing solutions in use were tested by laboratory methods and found deficient in bactericidal power. This is a matter of some consequence, as it is customary in Hawaii to drink soda water directly from the bottle. As it is obvious that this might afford opportunities for the transmission of disease, it was recommended that the empty bottles be treated with a solution which would kill pathogenic bacteria or be subjected to a degree of heat sufficient to destroy pathogenic organisms.

¹ See p. 82.

Laboratory diagnosis.—Aid has been given the Territorial health department in the study of diphtheria, the examination of blood for typhoid agglutination and other biological reactions, and the examination of pus, smears, etc.

The facilities of the station were placed at the disposal of the College of Hawaii for the study of the physiological properties of glucosides derived from the awa root.

Quarantine.—Acting Asst. Surg. Hollmann cared for several cases of contagious disease at the Territorial quarantine hospital at a time when it was not practicable to secure medical assistance from any of the Territorial medical officers.

COOPERATION WITH PORTO RICAN AUTHORITIES.

At the request of the governor of Porto Rico, Surg. W. W. King was detailed on September 20, 1913, for duty with the Institute of Tropical Medicine and Hygiene of Porto Rico. This detail was in addition to his duty as chief quarantine officer for Porto Rico.

The institute is an organization of the government of Porto Rico for the study of diseases of that country and climate, and is composed of physicians with special experience in such lines.

At the time Surg. King began his connection with the institute there was being organized a temporary clinic in the mountains of the interior with a view of making investigations into the diseases of the rural population, relieving their medical needs, and obtaining data and material for study later in the laboratory of the institute at San Juan. The clinic was established near the town of Utuado, a location convenient to a district of some 40,000 people. A synopsis of the operations of this clinic was published in the last annual report, page 72.

A laboratory suitable for various lines of research was installed.

At first the labors of the members of the institute were governed largely by the material available, but as the work progressed and became better known the field has become broader and more diversified. The members have worked independently upon some subjects and conjointly upon others, and along most lines satisfactory advancement has been accomplished. The progress of any scientific studies, especially research work, is necessarily slow and the time since the inauguration of this laboratory is yet too short for the completion of the investigations under way. The scope of these studies is briefly discussed below.

Sprue.—This genuinely tropical disease has been the subject of special study since the organization of the institute. Until the opening of the laboratory, this study was necessarily clinical, but since then particular attention has been paid to its etiology. The result of these studies as far as completed have been published in medical journals.

Filariasis.—This infection and its sequelæ, acute lymphangitis and elephantiasis, are prevalent in Porto Rico, and some work has been done upon them.

Trachoma.—The finding of trachoma in a rather large percentage of the patients at the Utuado clinic led to a further investigation of the disease. Begun during the early part of 1914, the work was

terminated and the results published in the Public Health Reports and issued as Reprint No. 241.

Malaria.—One member of the institute established a clinic at Barceloneta, a coast town in a district long notorious for the prevalence of malaria. Important observations were made upon the epidemiology, pathology, prophylaxis, etc., of the disease, the results of which will be published later.

Skin diseases.—The diseases of the skin have always played a prominent part in the field of tropical medicine and early attracted the attention of the members of the institute. The conditions of climate, temperature, habits of the people, and other factors favor the development of parasites, hence it is not surprising that many skin affections in warm countries are found due to them, especially to those classed as fungi. The study of these organisms as causal agents of disease has recently obtained great importance, and many obscure lesions have been found to be caused by them.

Various skin diseases have been studied at the institute laboratory, such as tinea of different kinds, otomycosis, blastomycosis, eczema, pellagra, skin ulcers, etc. In most of these cases various yeasts or fungi have been found, but their identification and study has not yet been completed for publication.

In addition to the organisms found in diseased conditions various fungi appearing as spontaneous growths occurring as saprophytes have been isolated and preserved for identification and comparison.

Other diseases.—Various diseases and conditions of great rarity or minor importance have been touched upon as opportunity and time have permitted. There exist in Porto Rico other tropical diseases of importance which are comprehended in the program of the institute, to be taken up in the future.

CONFERENCE WITH NORTH CAROLINA AUTHORITIES RELATIVE TO MANUFACTURE OF BIOLOGIC PRODUCTS.

On request of the president of the State Board of Health of North Carolina, Passed Asst. Surg. J. P. Leake was directed to proceed on January 15, 1915, to Raleigh, N. C., for the purpose of conferring with the secretary of the North Carolina State Board of Health and the director of the State laboratory of hygiene regarding the establishment at or near Raleigh of a State laboratory to manufacture biological products.

After investigation and thorough consideration of the situation, Dr. Leake's views were submitted to the secretary of the State board of health. The plans of the board contemplated action by the legislature authorizing the manufacture of biological products for free distribution or for sale at reduced prices and making an appropriation of \$15,000 for initial expenditure and an appropriation of \$7,500 for annual maintenance. In Dr. Leake's opinion, this amount would permit the manufacture of only one product, which it was understood would be diphtheria antitoxin. Even then the manufacture would have to be on a scale too small to allow any profits to accrue from sales at reduced prices, and therefore no great reduction in cost would result to the public. Dr. Leake suggested that the manufacture of antitoxin should not be undertaken, in view of the requirements of

safe and efficient operation, unless an appropriation was available of \$25,000 for initial expenditure and \$12,500 for annual maintenance.

It was also suggested by Dr. Leake that whether or not the manufacture of diphtheria antitoxin was undertaken by the State, the number of distributing centers of this product in the State should be increased to about 600, so as to make supplies available for all communities.

SCHOOL HYGIENE.

Studies in school hygiene formerly undertaken by the service in cooperation with local health authorities and boards of education have been extended and conducted in a more intensive manner during the past year. There is increasing necessity for the application of scientific medical and sanitary knowledge to the administration of the public schools in the interests of efficiency and health. This necessity is especially apparent in many rural communities, where effort has been improperly directed and much money unwisely expended for want of the necessary knowledge of the hygienic requirements of school life.

The purposes of sanitary and medical surveys, from the public-health standpoint, are to collect data for the standardization of the requirements of school hygiene; to collect mental and physical data over wide areas of the country which may be of value in establishing mental and physical standards for the youth of the Nation; to stimulate interest in sanitary surveys of schools; to instruct local health and school authorities wherever needed in the methods of making sanitary and medical surveys of schools and in the utilization of the knowledge gained thereby for economic educational advancement, instruction in personal hygiene, and the betterment of community health.

SANITARY SURVEY OF RURAL SCHOOLS IN PORTER COUNTY, IND.

On request of the State and local health authorities, Surg. Taliaferro Clark, Passed Asst. Surg. G. L. Collins, and Asst. Surg. W. L. Treadway were directed to make a sanitary and medical survey of rural school buildings and school children in Porter County, Ind. This survey was begun February 11, 1915, and lasted until May 10, 1915.

During this survey exhaustive studies were made of the hygiene of 75 rural schools, due attention being paid to the construction and location of school buildings, their heating and ventilating facilities, water supply, toilet facilities, and playgrounds. Numerous classroom observations were made, which included air examination, classroom temperatures, daylight illumination, type and arrangement of school desks, blackboards, location of windows, composition and color of walls and ceilings, position and arrangement of doors, and all other conditions which might affect the efficiency and health of school children.

Medical and mental examinations were made of 2,488 school children, of whom 1,254 were boys and 1,234 girls. The results of these studies, together with the recommendations based thereon, will be published in a forthcoming report.

SANITARY SURVEY OF THE NATIONAL TRAINING SCHOOL FOR BOYS, WASHINGTON, D. C.

In accordance with a resolution adopted on September 5, 1914, by the Committee on Expenditures in the Department of Justice of the House of Representatives, Surg. Taliaferro Clark and Passed Asst. Surg. E. H. Mullan were directed to make a sanitary survey of the National Training School for Boys, including a physical and mental examination of the inmates.

The National Training School for Boys is an institution situated in the District of Columbia, the trustees of which are appointed by the President. Its classes consist of persons not over 17 years of age committed by Federal courts and the district and juvenile courts of the District of Columbia. During the investigation in September and October, 1914, the sanitary condition of the buildings and grounds were carefully studied and 361 boys examined.

As a result of the physical examinations the following defects were discovered: Defective vision in 25.2 per cent of the boys examined, defective hearing in 5 per cent, defective speech in 3 per cent, defective teeth in 43.3 per cent, enlarged tonsils in 3.3 per cent, adenoids in 1.9 per cent, glandular enlargement in 39 per cent, and spinal curvature in 12.4 per cent. In addition, 16.9 per cent of the boys examined had less than 85 per cent hemoglobin.

The mental examination showed 20 cases afflicted with mental disease or mental defect and 16 suspicious cases, the percentage of mental defectives being lower than that reported in other reformatory institutions.

Faults in sanitary construction were noted in certain of the buildings, especially in regard to lighting and fire protection, the equipment and arrangement of the school rooms, location of dining room, kitchen, and pantry, screening against flies, etc.

Specific recommendations were made in the report submitted to the Committee on Expenditures in the Department of Justice for the remedying of the defects observed, especially in regard to the construction of a new building for the reception of newly committed boys, improving the lighting and fire-protection system of certain buildings, remodeling of toilets, screening, improving of playgrounds, providing the inmates with a well-balanced diet, removal of insane and epileptic cases, and employment of a medical psychologist to eliminate mental defectives and classify the school work according to mental age.

MENTAL EXAMINATION OF INMATES, NATIONAL JUNIOR REPUBLIC, ANNAPOLIS JUNCTION, MD.

As stated in the last annual report (p. 68), a physical and mental examination was made by Surg. Taliaferro Clark of the boys of the National Junior Republic, at Annapolis Junction, Md., in May, 1914. At the request of the superintendent of this institution a mental examination of the boys admitted to the institution since the survey of last year was made by the same officer in June, 1915.

In the course of this examination, completed June 15, 1915, 27 boys were examined mentally, among whom were found 8 mentally

defective, 1 constitutionally inferior, and 27 backward. The mental defectives constituted 29.6 per cent of the total examined, a percentage closely approximating that found in correctional institutions.

During the year a number of boys were received from various correctional institutions, which in large measure accounts for the high percentage of mental defectives found at the time of this examination. Primarily the republic is not intended for the reception of boys of this type. However, owing to the fact that a large number of delinquent and incorrigible children are mentally defective to a greater or less degree, it would be difficult to refuse admission to all mental defectives and at the same time continue the purposes for which the institution was founded.

As the result of this and previous inspections of this institution, recommendations were made by Dr. Clark for rigid physical examination and careful determination of the mental age of every child accepted by the republic, reorganization of the teaching staff to include preceptors especially skilled in the training of backward and mentally defective children, and the replacement of at least two of the present cottages by modern dormitories.

MENTAL EXAMINATIONS OF SCHOOL CHILDREN IN WESTCHESTER COUNTY, N. Y.

The commission to investigate provision for the mentally deficient in the State of New York requested the cooperation of the service in making a survey of Westchester County, N. Y., to determine the number of mentally defective persons residing therein.

In accordance with this request, Passed Asst. Surg. E. H. Mullan was detailed on October 31, 1914, to cooperate with the commission in its investigations. The plans of the commission contemplated at first a study of the number of mentally defective persons in Westchester County, the conditions under which they live, and the relation which mental deficiency bears in that county to education, poverty, delinquency, and other social problems. In view, however, of the fact that the report of the commission to the legislature had to be completed before February 10, 1915, it was deemed advisable for Dr. Mullan to limit his work to making a mental examination of the children in a typical school in Yonkers, Westchester County, N. Y. Dr. Mullan's studies were continued from November 19, 1914, to January 19, 1915.

The school selected, after conference with the superintendent of schools, had a registration of 1,205 pupils. A mental examination of 1,136 of these children actually attending school was made, using for the purpose tests similar to those employed in the examination of immigrant children at Ellis Island, N. Y. The results of the examinations showed 9 feeble-minded, 11 suspicious cases of mental deficiency, and 2 cases suspicious of epilepsy. The proportion of feeble-minded to the total number examined was therefore almost 8 to 1,000, and if the suspicious cases are included 18 to 1,000. It was regarded as certain by the investigator that some of the suspicious cases would later be shown to be positive cases of mental deficiency, and that others would in turn show improvement of intellectual

power. Nine of the above-mentioned cases of feeble-mindedness were found to have been born in the United States, the paternal parent in six cases being American born and in four cases foreign born.

A similar examination was made of 176 children in a parochial school in the same county. This examination resulted in finding five feeble-minded and one suspicious case.

The collection of data relating to sanitary environment, economic status, and other factors having a bearing on the presence of mental defects in the area investigated devolved on others associated in the work of the commission.

The technical examination of school children as conducted to determine mental status is time consuming but considered of great importance. By this means can the value of present tests be judged. Furthermore, improved tests may be developed and data collected which will throw light on the problems of handling and training mental defects.

APPARENT RELATION OF SANITARY ENVIRONMENT TO SCHOOL PROGRESS.

Advancement in school grades.—A study of 2,166 white children (1,062 boys and 1,104 girls) by Prof. C. W. Stiles in one city has shown the interesting fact that if the children are classified according to the presence or absence of a privy or of sewer connection (but no privy) at their homes the following results are obtained:

The girls averaged 80 per cent of the advancement in school grades to which they were entitled on the legal basis of entering school at 6 years of age and on the supposition that they were entitled to advance one grade each year thereafter.

The boys averaged 78 per cent of the advancement to which they were entitled theoretically.

Children who live at sewered homes seem to advance more rapidly than children who live at homes provided with privies. A group of 814 girls from sewered homes advanced 84 per cent, as compared with 72 per cent advancement in a group of 240 girls who lived at homes provided with privies; and a group of 772 boys from sewered homes advanced 81 per cent, as compared with 68 per cent advancement in a group of 194 boys who live at homes provided with privies.

It would thus appear that the sanitation (in respect to excreta disposal) may be taken as basis for classification of two groups of school children who show different degrees of school advancement.

While the type of sanitation is one factor that influences school-grade retardation, since more diseases of certain types will naturally occur under poorer than under better sanitary conditions, there must be taken into consideration certain other factors that play important rôles in the results obtained, for instance, general economic conditions, home influences, etc.

Memory span.—In both boys and girls there was in general a gradual increase in the memory span from the youngest (6 years old) group to the oldest (17 years old) group, but this increase was not regular for each successive year, for in the boys the 10-year-old group stood ahead of the 11-year-old group, and the 12-year-old group stood ahead of the 13-year-old group, while in the girls the

9-year-old group excelled the 10-year-old group, and the 13-year-old group excelled the 14- and the 15-year old groups.

The conclusion would seem justified that there was no essential difference brought out between the memory spans of the two sexes, and that while there was in general a gradual increase in the span from younger to older children this increase did not exhibit itself in absolutely exact ratio to age. It seems reasonable to expect the following memory spans in the city schools for white children in the locality under consideration:

	Numbers.
Children 6 and 7 years old.....	5
Children 8 to 13 years old, inclusive.....	6
Children 14 to 17 years old, inclusive.....	7

Dividing the children into sanitary groups, it was found that out of 24 comparisons 14 groups from sewerred homes and 10 groups from privy homes held first place.

SANITARY SURVEY OF SCHOOLS IN MANATEE COUNTY, FLA.

In connection with an investigation of the prevalence of trachoma among the school children of Manatee County, Fla., made by Surg. J. A. Nydegger at the request of the State Board of Health of Florida, a sanitary survey of the schools in that county was also undertaken. This survey lasted from March 13 to March 26, 1915, and included (1) a medical examination of school children, with special reference to the occurrence of contagious and infectious diseases and physical and mental defects; (2) a sanitary inspection of school buildings, outhouses, water supply, excreta disposal, grounds, etc.

In all, Dr. Nydegger inspected 25 schools and examined 1,684 children. Eleven of the schools were rural and the rest urban. Most of the rural schools were, however, closed at the time of the visit. Address on public-health subjects were delivered at all the schools visited.

It was found that 26 per cent of the children examined had defective teeth, 16.2 per cent enlarged tonsils, 13.4 per cent adenoids, 12.4 per cent anemia, while hookworm disease was prevalent to a moderate extent. Nine cases of apparent mental defectiveness were also detected and 1 case of ringworm.¹

In regard to sanitary conditions in general, as exemplified by methods of sewage disposal, water supply, ventilation, etc., 1 of the schools could be classified as excellent, 8 as good, 7 as fair, and 9 as decidedly bad. As a rule there was noticed a marked improvement in all the schools recently constructed in regard to lighting, heating, ventilation, location, sanitary arrangements, and general equipment.

The complete report of Dr. Nydegger's investigation has been published as Supplement No. 25 to the Public Health Reports.

NEED FOR IMPROVEMENT IN RURAL SCHOOLS.

As surveys of sanitary conditions in rural sections are being made by the service it becomes more and more apparent that organized health work in schools has so far been largely confined to cities. It

¹ See also p. 39.

is obvious that this work must be extended to country districts, where so many people reside without receiving the necessary instruction in the prevention of disease.

The sanitary needs revealed are many. In general, the faults observed are due to lack of skilled advice, and apply especially to the location, construction, and equipment of school buildings. Sewage disposal in rural schools, for instance, is often inadequate, insanitary privies being practically the rule.

Instruction in sanitation can be given in large measure through rural schools. In the case of such diseases as trachoma, tuberculosis, typhoid fever, and hookworm disease the schools may be made educational centers of the greatest importance in the control and prevention of the insanitary conditions which favor the spread of these diseases.

It is believed that proper attention to the construction, equipment, and maintenance of rural school buildings with respect to location, playground facilities, heating, lighting, ventilation, seating, water supply, sewage disposal, and lavatories must result not only in better health for the children, but serve as object lessons in sanitation which will be of general benefit to the surrounding community. From a sanitary standpoint the recent movement for the consolidation of rural schools is to be commended, since it must eventually result in the lengthening of the school year, the providing of better buildings, and the organization of sanitary inspection of schools and school children, and district nursing.

RURAL SANITATION.

In the fiscal year 1915 rural sanitation work, under the direction of Surg. L. L. Lumsden, was continued in Berkeley County, W. Va., Lawrence County, Ind., and Union County, Miss., and was undertaken in Dorchester County, Md., Anne Arundel County, Md., Orange County, N. C., Walker County, Ala., Wilson County, Kans., and Dallas County, Iowa. In the annual report for 1914, pages 59-62, reference was made to the work in progress in Berkeley, Lawrence, and Union Counties. In Dorchester County the sanitary survey was begun on July 10. The work was terminated in Dorchester, Berkeley, Lawrence, and Union Counties on November 15, 1914.

Dorchester County, Md.—The force of workers in Dorchester County consisted of three officers—Asst. Surg. J. B. Laughlin, K. E. Miller, and G. A. Wheeler—from the Public Health Service and of six whole-time health officers from the Maryland Department of Health. Two of the State health department officers, who earlier in the season had served as acting epidemiologists of the Public Health Service in Lawrence County, Ind., and all three of the service officers had had practical experience in this particular class of rural sanitation work. Dr. John S. Fulton, secretary of the State department of health, spent a considerable proportion of his time during the work with the men in the field in Dorchester County. After the plan of survey was developed and the work started in Dorchester County, Surg. Lumsden continued his rounds of the four counties in which the work was in progress, spending about one-fourth of his time in each. During his absence from Dorchester

Asst. Surg. Laughlin was in immediate charge of the work in that county. Although Dorchester County is a large county, with an area of 576 square miles and with a population of about 29,000, the number of workers, constituting probably the largest force of whole-time health officers ever assigned to duty for any considerable period in any one county, was ample to carry out a very intensive plan of study. The work in this county was of particular importance in that it brought together in the execution of the details of rural sanitation a number of the State district health officers, who later on were to be assigned to duty in the different sanitary districts of Maryland in accordance with a recent enactment of the State legislature.

PURPOSE AND PLAN OF THE WORK.

The purpose of this work on rural sanitation is both investigative and educative. By a detailed canvass and survey of all the homes in a number of counties located in different parts of the United States the actual sanitary conditions and the popular knowledge of sanitary matters obtaining in the average community in the rural districts of this country will be determined. The findings are made a permanent record. From time to time resurveys of these counties may be made, and thus sanitary progress in our rural districts may be estimated from the index furnished by the accurately registered findings in these counties. Officers of the service studying the various problems of rural sanitation in different sections of the country have a particularly favorable opportunity to determine improved methods for carrying out sanitary measures under widely varying conditions. Local health officers in the different States working with the service men engaged in these studies of rural sanitation can gather from them first-hand information about experiences and results in other States. Thus this work may foster the adoption of uniform, or standard methods for the investigation and control of certain communicable and preventable diseases which are now highly prevalent throughout the great expanse of country embracing the rural districts of the United States.

In the canvass of the homes the interest of the persons interviewed is usually awakened. In the survey of the home some member of the household usually accompanies the investigator and observes with him the sanitary or insanitary conditions obtaining on the premises. From the awakening of interest and increasing of knowledge in matters of sanitation directly among the citizens of the counties worked in, advancement, and perhaps progressively increasing advancement, in sanitation at the homes in these counties can reasonably be expected to result. If such should be the case, these counties will furnish examples from which other counties may profit.

The plan carried out in 1914 in Berkeley, Lawrence, Union, and Dorchester Counties, and now being carried out in Anne Arundel, Orange, Walker, Wilson, and Dallas Counties, is (1) to visit, canvass, make a sanitary survey of, discuss with the people the sanitary conditions of the premises and leave appropriate public-health literature at practically every home in the county; (2) to revisit from time to time a number of homes in different neighborhoods throughout the county to ascertain progress made and to encourage further prog-

ress in sanitary improvements; (3) to give (illustrated) public lectures on sanitation in different neighborhoods as frequently as appear indicated; (4) to endeavor to get local physicians, clergymen, school-teachers, newspaper publishers, and prominent citizens generally to give their active cooperation to the work; (5) to encourage existing organizations to support the work and to form new organizations having as their primary purpose the advancement of sanitation; (6) to inspect schools, churches, railroad stations, post offices, and stores and to report the findings to the proper authorities; and (7) to survey the incorporated towns in the county and to make specific recommendations to the local authorities about the sanitary disposal of human excreta, the prevention of fly-breeding, the protection of food supplies, and the safeguarding of water supplies.

In the four counties worked in in 1914 the number of homes in the distinctly rural districts canvassed and surveyed was 13,904; the number of homes specially canvassed and surveyed in the incorporated towns was 6,302, making a total of 20,206. The number of homes revisited one or more times was over 3,000. The number of public meetings held was 156.

SANITARY CONDITIONS IN COUNTIES.

In the four counties studied in 1914 it was found on the original survey that at less than one-half of 1 per cent of the homes were sanitary toilets in use. In one of the counties 78 per cent of the rural homes were found to be unprovided with privies of any kind. In all four counties the vast majority of the privies in use were of the surface, open-in-back variety, in and about which there was gross soil pollution, with all of its attendant danger, in the immediate vicinity of the homes.

At over 50 per cent of the homes the water supplies in use were obviously polluted or of a very suspicious character.

The vast majority of the people interviewed were found either to be entirely uninformed or to have very erroneous ideas about the source and modes of spread of typhoid fever and other excreta-borne infections and about the principles of preventing dangerous pollution of the soil and of water supplies. In practically all instances the people at the homes visited became interested in the principles of sanitation discussed with them.

Taking the conditions found in these four counties as fairly representative of those obtaining in the rural districts generally throughout the United States, rural sanitation looms large among the matters vitally affecting the welfare of the Nation.

RESULTS OF SURVEYS.

It is difficult to estimate the results of work which is largely of an educational character. From an investigative standpoint alone the definite data collected appear to be of sufficient value to justify the necessary expenditures for such work. What will be the eventual effect of the better understanding of the principles of sanitation by the men, women, and children in the four counties surveyed in 1914 is not now, and probably will not become in the future, definitely de-

terminable. The evidence obtained, however, is conclusive that as a result of the work the proportion of persons in these counties having a reasonably clear understanding of the modes of spread and of the measures for the prevention of typhoid fever and other filth-borne infections was increased manifold. The influence of this increased knowledge of rural sanitation may in various ways be extended to other counties.

Among the tangible results noted as the work went on was a marked improvement in the construction and maintenance of privies, in water supplies, in screening of dining rooms and kitchens, and in the exercise of precautionary measures about the bedsides of persons sick with communicable diseases.

In one of the four counties, before the service operations were discontinued, definite improvements in privy construction were found to have been effected at over 30 per cent of the homes. Throughout the country neighborhoods in all four counties evidence was obtained of considerable improvement in the methods of collecting and disposing of human excreta. An encouraging fact is that this was the case in many instances among tenants and among families in financial straits at whose homes no privies were provided.

In each of the four counties at the time the Public Health Service forces were withdrawn sanitary improvements were being made at a rapid rate. According to reports from two of these counties excellent progress was still being made in the spring and summer of 1915.

In every town having a population of 500 or over, in the four counties, marked improvements in sanitation were accomplished, and in most of the smaller towns and villages notable improvements were made. In every incorporated town in Dorchester County, of which there are five, with money appropriated for the purpose by the town authorities a clean-up and disinfection of all privies was accomplished. This work was done under the supervision of the service and State health officers. After the clean-up the majority of the privies in these towns were modified in construction so as to be of a more sanitary type. The owners of the properties voluntarily had this part of the work done at their own expense.

In Martinsburg, the county seat of Berkeley County, and in Bedford, the county seat of Lawrence County, the water supplies, which previously had been of bad sanitary quality, were made good.

In Martinsburg, with a population of about 12,000 and without a sewerage system, every privy was thoroughly cleaned and disinfected—the privy contents, amounting to more than 20,000 bushels, being removed, disinfected, and buried at a proper place in a sanitary manner.

In Cambridge, Md., with a population of about 9,000, all the privies, 1,614 in number, were cleaned and disinfected and most of them were markedly improved in type.

In Mitchell, Ind., with a population of about 4,000 and without a sewerage system, over 75 per cent of the privies were cleaned, disinfected, and converted from a grossly insanitary to a sanitary type.

In Bedford, Ind., the same was done for about 200 privies. In both Mitchell and Bedford the work was still in progress when the service operations were discontinued in November, 1914. It is reported that in the following spring the sanitary work on privies in both these cities was carried to completion.

In New Albany, Miss., with a population of about 2,500, all privies, of which there were about 400, were cleaned, disinfected, and remodeled from open-back surface type to a sanitary type with watertight receptacles and of fly-proof construction. Six months later, in a cleanest-town-in-the-State contest, New Albany is reported to have been given a score of 98.

In all of the larger towns in the four counties ordinances were passed and more adequate scavenger services were established to keep privies in sanitary condition. In most of these towns the local health force was augmented.

Typhoid fever reduction.—Apparently as a direct result of the sanitary work there was in the four counties a marked reduction in typhoid fever for the summer and fall seasons of 1914 as compared with the corresponding seasons for previous years.

In Berkeley County there were reported for the period April 1 to November 1, 1913, 249 cases of typhoid fever, and in the corresponding period of 1914 only 40 cases. According to the evidence the report of cases for 1914 was much more nearly complete than it was for 1913.

In Lawrence County for the period June 1 to November 1 of 1913, 14 deaths from typhoid fever were reported, and in the corresponding period of 1914 only 2 deaths from typhoid fever were reported.

In Dorchester County for the last four months of 1913, 20 deaths from typhoid fever were reported, as against only 3 for the corresponding period of 1914.

For Union County, reports of typhoid fever for previous years are not available, but according to such evidence as could be collected it appeared that typhoid fever was considerably less prevalent in the late summer and fall seasons of 1914 than it had been in corresponding seasons of the average previous year.

Along with the reduction in typhoid fever in these counties there appeared to be a wholesome reduction in other diseases which result from filth-borne infections.

WORK NOW IN PROGRESS.

The results obtained in Berkeley, Lawrence, Union, and Dorchester Counties in 1914 appeared to warrant an extension of such activities of the service to other counties. Work along the same general lines is now in progress. The officers in immediate charge of the work in each of five counties selected are as follows: Asst. Surg. J. B. Laughlin in Anne Arundel County, Md.; Assistant Epidemiologist F. E. Harrington in Orange County, N. C.; Asst. Surg. R. E. Wynne in Walker County, Ala.; Asst. Surg. H. C. Yarbrough in Wilson County, Kans.; and Asst. Surg. K. E. Miller in Dallas County, Iowa. The force of service men engaged in the work in the five counties numbers 19. In each county from one to four men from the State health department are assisting in the field work.

The headquarters for the rural sanitation studies has been established at St. Louis, with Surg. M. J. White as executive officer.

Epidemiologist A. W. Freeman has general supervision over the work in Wilson and Dallas Counties and divides his time about equally between the two.

The following tabulated statement gives some idea of the extent of work in these five counties in the fiscal year 1915:

County.	Survey begun 1915.	Number of homes canvassed and surveyed.	Number of schools inspected.	Number of churches inspected.	Number of post offices inspected.	Number of railroad stations inspected.	Number of public lectures given.
Anne Arundel.....	Apr. 21	3,619	26	9	3	0	23
Orange.....	May 4	2,166	25	31	4	2	47
Walker.....	May 24	1,480	0	0	3	6	25
Wilson.....	May 1	2,480	56	22	1	4	17
Dallas.....	June 15	335	17	3	0	2	1
Total.....	.....	10,080	124	65	11	14	113

Adding these 10,080 to the rural homes canvassed and surveyed in the period July 1 to November 15, 1914, gives a total of 16,369 for the fiscal year 1915.

From the beginning of the work in the spring of 1914 to June 26, 1915, the grand total of rural homes visited one or more times and canvassed and surveyed was 23,984.

With the larger force of trained men in the field and with the experiences of the previous year to profit from, the progress of the work this year is being facilitated and good results are already assured.

Upon the termination of the active field work in the several counties this fall a complete report of these studies of rural sanitation is to be prepared for publication as a Public Health Bulletin.

The tangible results of these operations indicate that marked advancement of sanitation in the rural districts generally is feasible and that increased appropriations to enable a rapid extension of the activities of the Public Health Service along these lines would be highly in the interest of national economy and efficiency.

NEW HANOVER COUNTY, N. C., EXPERIMENT.

A number of sanitarians are convinced that a better disposal of human excreta represents the greatest single sanitary need in the hookworm area. A few workers have felt that the problem involved in inducing the laity to improve existing conditions is of such a nature that for practical purposes it is necessary, or at least best, to begin by inducing families to install primitive privies of the "pit" type. Holding, on the contrary, that higher ideals should be adopted by the public in general, Prof. C. W. Stiles, of the Hygienic Laboratory, instituted a cooperative experiment with the county board of health and Dr. Charles T. Nesbitt, county health officer, in New Hanover, N. C.

The plan adopted was to place facts before the public in as quiet and friendly a manner as possible by public lectures and by personal interviews and correspondence, especially with the parents of the school children. For a brief period the State board of health cooperated in one rural township in the county.

During the experiment addresses on sanitation were given at various public schools and churches and before local clubs of dif-

ferent kinds. Personal appeal was made, either by letter or in conversation, to the parents of every school child who could be reached.

The sanitary police of the local board of health inspected every home and explained to the persons at every rural home and at many city homes the necessity for better methods of excreta disposal. The assistant county health officer, Dr. Thames, visited all the schools and urged improvements. The county health officer, Dr. Nesbitt, worked especially with the landlords of tenant houses. A representative of the State board of health visited every home in one township, and in addition held a number of public meetings.

When the work started New Hanover County presented conditions that corresponded to the average, or possibly a little above the average, of counties of its type. An idea of the improvements made may be gained from the following figures: In June, 1911, the city of Wilmington had on the scavenger's list 5,280 privies, nearly all of which were of the surface type, and it is estimated that the total number was as near 6,000 as 5,000. By actual count in March, 1914, there were 3,997 privies; these were nearly equally divided in number between the surface type and the receptacle (can) type; on the scavenger's list there were 3,158, of which 1,487 were of the surface type and 1,671 of the can type.

The campaign became more intensive in April, 1914, and by August 31, 1914, the privies had been reduced by 1,998, as closely as could be estimated from available data. This reduction was due chiefly to the installation of flush closets. During the calendar year 1914 Wilmington installed 1,856 new flush closets, an average of 154 per month. An indication of the public interest aroused is shown by the fact that the city council finally voted to make available the sum of \$50,000 on loan for the exclusive purpose of changing privies to flush closets.

Outside of the limits of Wilmington the county of New Hanover has four rural townships, with a total area of 164.11 square miles, and a total population of 7,055 (4,113 whites and 2,942 negroes).

In 1913 the privy conditions at the rural (county) schools was very poor. During the campaign (1914) the board of education installed concrete privy vaults (of the L. R. S. type, with subsoil drainage) at every school, thus placing these schools in the lead in this respect probably of all county schools in the South.

In 1913 there were many rural homes without any privy, and only at the better class of homes were the privies of fairly good construction and maintenance. According to the inspection reports of the sanitary police up to date every dwelling, with four exceptions, in the four rural townships is now provided with a privy of one type or another. Not every privy is of the highest type, but the improvement is very marked; many of them are of the receptacle type; many are screened against flies; and perhaps most important of all factors, the people have developed a healthy respect for sanitation that promises continued improvement.

A movement of this kind is not completed in one day or in one year, but if a proper policy is adopted the public can be brought to an intelligent realization of the necessity and value of improved methods of excreta disposal, and this realization is felt to be the fundamental element in the future improvement of rural sanitation of this country.

LEPROSY INVESTIGATION STATION.

Leprosy work has been carried on both at Kalawao and Kalihi, Hawaii, during the year. The material available at Kalihi became large enough early in 1915 to justify concentrating the entire staff there.

Surg. G. W. McCoy continued as director of the station and Mr. M. T. Clegg as assistant director. Acting Asst. Surg. H. T. Hollmann, who was on sick leave at the date of the last annual report, returned to duty September 1, 1914.

Cultural studies.—Comparatively little cultural work has been done during the past year other than that confirmatory of previous investigations. A few efforts to grow organisms from leper tissues by the fresh-ascites-fluid-tissue method have failed, as had previous ones. It may be mentioned incidentally that the examination of leproma juice and of blood of lepers by dark field illumination have given no positive results.

Immunity studies.—The chief point of interest in the immunity work was that apparently an antigen made by boiling acid-fasts with a weak alkali had a larger degree of specificity than others. Complement deflection tests with the blood of lepers controlled by serum from a large number of healthy persons and from persons suffering from other diseases show that this antigen may be of value in the diagnosis of obscure cases of leprosy.

Animal inoculations.—Additional animal experiments, with a view to producing the disease, have proved negative. It is believed that it may be asserted safely that leprosy has never been produced in the lower animals. It is true that the acid-fast bacilli may persist for long periods in animals, and there may even be tissue proliferation about them which may simulate a leprous lesion, but that a definite progressive malady in any way comparable to leprosy has been observed is more than doubtful.

Clinical studies.—Further studies of autopsies on Hawaiians have failed to show early lesions of leprosy.

The plan of having the staff of the station render all medical attendance required at the Kalihi receiving station has been in operation for over a year and has been found to be very satisfactory. The service has control of a sufficient volume of material to make it possible to carry on the work with much more satisfaction than previously.

During the past year 87 cases of leprosy have been under treatment by the staff of the station.

Chaulmoogra oil.—The therapeutic agents to which attention has been given chiefly are chaulmoogra oil by intramuscular injection and the local application of carbon-dioxide snow. About 30 patients have been given chaulmoogra oil injections for a period of over six months, some of them for a year. The results have not been so favorable as it was hoped they would be. While many of the patients have improved, none show any marked indications of becoming free from the disease. An abscess has developed at the site of inoculation in several cases and painful induration in a larger number. Three patients while taking the injection developed multiple lepromata with marked febrile reactions. This complication occurs frequently in cases of leprosy that are not under treatment.

Carbon-dioxide snow.—There has been sufficient opportunity to observe the results of treatment with carbon-dioxide snow to enable one to form an opinion as to its value. No case has been seen in which the patient became free from gross or microscopical evidence of leprosy as a result of the treatment, but definite recession of lesions and decided improvement in appearance have been observed. As has been pointed out so often, it is frequently impossible to say how much of any improvement is due to a medicinal agent. Very marked improvement in patients who took practically no treatment whatsoever has been observed among several lepers under the care of the service.

Surgical treatment.—Aside from the purely experimental treatment of patients such remedies have been employed and such surgical measures have been taken as were necessitated by symptoms and complications. It is not sufficiently understood that operative procedures may be of great use in leprosy. Hopelessly necrotic fingers and toes may be amputated and carious bones may be removed always greatly to the patient's advantage. Nerve stretching for neuritic pains in the distribution of the ulnar sometimes gives much relief. Painful and disfiguring nodules often may be removed to advantage.

Examination of lepers.—During the year the director has served on 43 leper examining boards at Honolulu and on 37 at the Molokai settlement. The acting assistant surgeon has served on 73 boards at Honolulu and on 32 at the settlement. Members of the staff have conducted 41 unofficial examinations of suspects. With the exception of two original examinations, the examinations at the settlement were for the purpose of passing on persons who had applied for parole or for examination to determine whether they were lepers. Two were found to be nonlepers, while 14 were recommended for parole. All of these were liberated by the board of health. A child 19 months of age, suffering from leprosy, came under observation at the settlement. This is believed to be the youngest leper observed anywhere. The parents were lepers.

The number of new cases of leprosy coming under the control of the Territorial health department during the year was 68, a gain of 15 over the preceding year.

Assistance to other branches of the public service.—It has always been the endeavor of the various officers in charge of the station to make it as generally useful as practicable without interfering with the leprosy studies, and under bureau orders authorizing giving assistance to the quarantine service and to the local health authorities, this field of usefulness may be greatly extended.

Assistance has been given to the officer in charge of the relief work of the service in the making of autogenous vaccines, performance of Wassermann reactions, blood counts, and the examination of one leper suspect (negative).

HYGIENIC LABORATORY.

Surg. J. F. Anderson has continued during the year as Director of the Hygienic Laboratory. An account of certain of the investigations conducted at this station will be found below. Reference to special work performed in part at the laboratory or directed by offi-

cers connected with the laboratory in the field will be found under the following headings: Coastal waters; Sewage disposal; Waste disposal; Industrial sanitation; Hookworm disease; Pellagra; School sanitation; Viruses, serums, and toxins; Rural sanitation; etc.

Personnel.—At the end of the fiscal year the personnel consisted of a director, an assistant director, a professor of zoology, a professor of pharmacology, a professor of chemistry, 20 commissioned medical officers, 2 pharmacists, 7 technical assistants, 1 sanitary chemist, 1 sanitary bacteriologist, 1 organic chemist, an artist, and 34 miscellaneous employees: a total of 71.

In addition, 18 employees engaged in field investigations, particularly with reference to methods of sewage disposal and trade wastes, made use of the facilities of the laboratory for a portion of their investigations.

Course of instruction.—The class receiving instruction at the laboratory during the last fiscal year consisted of 10 officers, one of them being relieved from duty by the bureau before the course was completed.

The course of instruction given officers has been greatly broadened and an effort made to adapt the instruction, so far as possible, to the needs of the individual officers in connection with their service work. A requirement introduced into the course this year was the assignment of subjects to the individual officers in order that they might prepare theses upon them and present their work at meetings of the class, at which a number of the laboratory staff were always present. The papers were critically discussed and the author of each thesis was required to defend it. It is believed that this feature of the course will be of value to officers when they leave the laboratory, as it tends to give them confidence in their ability to take part in discussions of sanitary and health questions.

A total of 39 lectures were given the class by representative persons, most of them being officers of the service.

Buildings and grounds.—Before the close of the fiscal year the animal house and disinfection rooms, for which an appropriation of \$25,000 had been granted by Congress, were completed and occupied, but owing to the lack of available funds for the construction of animal cages it was necessary to construct temporary pens placed upon the floor of the building for the care of the animals.

The building consists of three stories and a basement. The top floor is not divided into rooms, and is used for the storage of surplus stock and unserviceable property. The second floor is intended for animals. In addition, this floor contains bins for the storage of forage and food for those animals. The first floor contains a carpenter shop, a shower bath, and a number of small rooms especially arranged for the isolation of animals. There are also on this floor two rooms designed for the conduct of experiments upon the value of different disinfectants, particularly gaseous disinfectants. In addition there is a small room which is intended to be fitted up as a laboratory for use in special investigations made in the building. The basement contains stalls for the horses, a blacksmith shop, boiler room, fuel vaults, harness room, and room for the storage of the laboratory wagon; and there is located in the basement a pit for the collection of animal refuse. Into this pit leads a chute with branches to vari-

ous floors, each opening being at the floor level, so that the refuse may be swept into the chute and deposited in the pit below. The pit is thoroughly screened and darkened to exclude the breeding of insects.

Contracts have been let by the Supervising Architect's Office for the grading of the grounds and resurfacing of the present entrance to the laboratory grounds. In addition to the grading there is being constructed a roadway connected with the present roadway leading to the new animal house, with an exit on the southern end of the reservation. The use of this roadway will obviate to a large extent the use of the present entrance through the grounds of the Naval Medical School.

Library.—In October, 1914, Dr. Murray Galt Motter, technical assistant in pharmacology, in addition to his other duties was placed in charge of the library. Since this arrangement went into effect the number of those using the library has much increased and the number of books made use of considerably enlarged. There were at the close of the past fiscal year 5,748 bound volumes and 10,263 Library of Congress index cards in the library.

Under section 59 of the copyright law of March 4, 1909, the library now participates in the distribution of copyright deposits, and has thus far received 138 volumes, bound and unbound.

In addition to the constant consultation of books and periodicals in the library, the laboratory workers have withdrawn over 400 volumes for work outside the library proper and have borrowed an equal number of books from the other departmental libraries.

TUBERCULOSIS AMONG GOVERNMENT EMPLOYEES.

Eleven Federal employees were examined, at the request of their administrative officers, at the laboratory during the year for tuberculosis. Three were positive, six were negative, and in the other two the diagnosis was inconclusive.

In addition to the examination of these employees advice was given to others who had previously been examined at the laboratory in regard to the proper mode of living so as to prevent, if possible, a recurrence of tuberculous infection.

AID TO OTHER BRANCHES OF THE GOVERNMENT SERVICE.

Under instructions from the bureau the laboratory has examined a number of specimens of a various nature submitted by other branches of the Government service for diagnosis.

Health department of the District of Columbia.—A number of specimens of water have been examined in the laboratory, most of the specimens being from schools located in the District.

Sewer department of the District.—A large number of specimens of water from the various streams in the District of Columbia have been examined for bacterial results at the request of the superintendent of sewers. These data are being accumulated for use in connection with the question of a metropolitan sewerage system for the disposal of sewage in and around the District of Columbia.

Office of superintendent of buildings and grounds.—At the request of Col. Harts, the superintendent of buildings and grounds,

109 samples of water from the tidal basin and 33 samples from the Potomac River taken at a point near the inlet of the tidal basin were examined in connection with the possible use of the tidal basin for bathing purposes. It was found that 17 per cent of the samples from the tidal basin and 15 per cent from the Potomac River contained the colon bacillus in 0.01 c. c., and that 74 per cent from the tidal basin and 70 per cent of the samples from the Potomac River contained the colon bacillus in 0.1 c. c. These results indicated a rather serious contamination of the water, both in the river and in the tidal basin, and it was suggested to Col. Harts that, in view of these results, grave consideration should be given to the advisability of forbidding the use, without treatment, of the water of the tidal basin for bathing purposes.

Army Medical School.—At the request of the commandant of the Army Medical School, the director of the laboratory delivered a lecture before that school on typhus fever and its prevention. Surg. Stimson also delivered a lecture on rabies before the school.

Naval Medical School.—Lectures were delivered by members of the laboratory staff to the students of the Naval Medical School.

Bureau of Chemistry.—At the request of the Bureau of Chemistry, opinions in regard to certain matters were rendered for use by that bureau in connection with the enforcement of the pure food and drug law.

Civil Service Commission.—At the request of the Civil Service Commission members of the laboratory staff assisted in the examination and grading of papers in a number of technical examinations.

COOPERATION WITH THE COMMISSION ON MILK STANDARDS.

The director of the laboratory has been a member of the national commission on milk standards since its organization in cooperation with the New York milk committee. The commission has prepared two reports, which have been published by the Public Health Service. The distribution of the reports has resulted in the adoption of grades and classes of milk in a large number of cities and the adoption of bacterial standards by a considerable number.

Recently research has been conducted under the auspices of the commission in regard to the factors having to do with variations in the bacterial count of milk when the tests are made by different persons.

AID TO THE PHARMACOPOEIA.

The assistance which has been extended in previous years to the revision committee of the Pharmacopœia by the director of the laboratory, who is chairman of subcommittee on biological products and reagents, has been continued. Practically all this work has now been completed.

DIVISION OF PATHOLOGY AND BACTERIOLOGY.

Milk studies.—The milk station which was opened at the laboratory in August, 1912, was finally discontinued on December 1, 1914, with the assent of the Bureau of Animal Industry. This action was necessitated by the widespread prevalence of foot-and-mouth disease

in and around Washington, as half the beneficiaries of the laboratory received raw milk which it was not deemed advisable to furnish to the babies on account of the possibility of milk-borne infection. Moreover, in spite of all efforts made, the number of babies receiving milk from the station gradually diminished. For this reason it is believed that the results to be expected from a continuance of the work would be of such slight value as not to justify its continuance under the plan originally outlined.

The question of the relative value of raw and pasteurized milk is of importance, but it is believed that the investigation into the question could be made only where the babies under observation can be kept under strict control, as in an institution. When children are given milk at their homes, many disturbing factors are encountered which enter into the results, rendering the data of questionable value. Plans are now on foot to obtain the cooperation of an institution in the District of Columbia for the resumption of these studies.

Relation of bacterial content of milk to sanitary quality.—The present card in general use for the scoring of dairies does not seem to be satisfactory in correlating the score with the bacterial content of the milk. For this reason the matter has been given consideration at the laboratory to determine whether, by assigning new values to certain factors involved in the production of milk, it might not be possible to detect from the score the bacterial content of the milk. Arrangements have been made with one of the largest dairies in Washington for cooperative study on this line, and it is hoped that before the close of the next fiscal year something of definite value in this direction will have been obtained.

Rocky Mountain spotted fever.—After his return from Montana in the fall of 1914, Surg. Fricks resumed his attempts to cultivate the organism of spotted fever. At the suggestion of the director of the laboratory he also made a considerable number of attempts to transmit the disease from animal to animal by the bite of insects other than the tick. He used in his experiments the bedbug and the stable fly. The experiments, however, resulted negatively.

It is hoped that when Surg. Fricks returns this fall from Montana that these and other studies on the virus may be resumed. A report of his field work in Montana will be found in another part of this report.¹

Scarlet fever.—The director of the laboratory has been cooperating with Surg. C. H. Lavinder, stationed at Ellis Island, in studies upon scarlet fever in the endeavor to transmit the disease to animals. The studies so far have not given much encouragement, but they are being continued, and it is hoped that the use of other procedures now under consideration may make possible a satisfactory outcome of the experiments.

During the winter of 1914-15 arrangements were made with the health officer of the District of Columbia for an epidemiological study of scarlet fever. It was found that the disease was prevailing to a greater extent than usual in the District of Columbia, and it was hoped that by an intensive epidemiological investigation of the disease some light might be thrown upon the methods of transmission. In addition, it was hoped that some information might be gained in regard to the duration of the infectivity of the disease.

¹ See p. 262.

Up to the close of the fiscal year about 600 cases had been closely investigated, and it is purposed to continue the studies for at least a year or to the end of the calendar year. So far as known a similar study of this disease has not been made in any place extending over so long a period.

Investigation of Von Ruck treatment for tuberculosis.—The investigation of the Von Ruck treatment for tuberculosis, required by Senate resolution No. 89, of May 26, 1913, and placed in immediate charge of Surg. A. M. Stimson, was completed and the report transmitted to the Senate.

Surg. Stimson was unable to confirm the claims of Drs. Von Ruck as to the value of their methods and practices in the prevention and cure of tuberculosis. His complete report with conclusions was published as Senate Document No. 641, Sixty-third Congress, third session.

Complement fixation test.—Upon the completion of the Von Ruck investigation, Surg. Stimson took up a study of antibodies in tuberculosis. As the result of his work he was able to demonstrate, by means of the complement fixation test, the presence of antibodies in tuberculosis in certain stages of the disease. It was found that these antibodies when present are indicative of active tuberculosis, and that when not present this indicates either a healed tuberculosis, a very advanced stage of the disease, or freedom from the disease. In this way the complement fixation test is of use in the diagnosis of tuberculosis and has a distinct value over the Von Pirquet test. In addition, it is of prognostic importance.

Distribution of antirabic virus.—During the year 39 patients received antirabic treatment at the Hygienic Laboratory.

The above is the smallest number of patients receiving the treatment at the laboratory since the beginning of the work. It is believed that this decrease in numbers is due to two main causes: (1) Many patients from the State of Virginia who formerly received the treatment at the laboratory are now treated at the laboratory of the State board of health in Richmond, and (2) the decrease in the number of dogs in the District of Columbia due to a stricter enforcement of the muzzling regulation. It has been a matter of comment at the laboratory that the number of persons bitten by dogs in the District has shown a marked decrease, and the District health officer is to be congratulated upon this achievement.

During the year 1,864 complete antirabic treatments were sent out from the laboratory on request, as follows:

Treatments.		Treatments.	
Alabama	382	New York	24
Arizona	6	North Carolina	182
Arkansas	24	North Dakota	1
Colorado	4	Oregon	25
Delaware	21	Panama Canal	12
Illinois	231	Tennessee	67
Indiana	118	Virginia	81
Iowa	32	Washington (State)	133
Kansas	37	West Virginia	15
Kentucky	217	Wisconsin	2
Massachusetts	128	United States Army	15
Mississippi	83	United States marine hospitals	2
Missouri	11		
Nevada	11	Total	1,864

Efforts are being constantly made in the Hygienic Laboratory to improve the method of preparing antirabic virus in order that the institute maintained at the laboratory may serve as a model for those in other places. During the fiscal year a special effort was made to improve the technique. Rabbits are now numbered by means of tags at the time of inoculation, so that the identification of any individual rabbit is facilitated.

Diagnosis of rabies.—During the fiscal year the heads of 139 animals were received at the laboratory for examination with a view to the diagnosis of rabies. The number and kind of animals, together with the results of the examinations, are shown in the following table:

Animals.	Positive.	Negative.	Total.
Dog.....	52	50	102
Cat.....	3	4	7
Cow.....	4	3	7
Horse.....	0	1	1
Hog.....	2	1	3
Sheep.....	1	0	1
No examination (decomposed).....			18
Total.....	62	59	139

When animals are found negative on examination of smears, sections are made and examined and animals are inoculated. In event any of the inoculated animals develop rabies, a telegraphic report is immediately sent to the person from whom the head was received.

Immunization against rabies.—There are at the present time at least four rather widely used methods for the propagation of antirabic virus for use in the prevention of rabies. There are in addition several others which are not so widely used. The most widely used methods are the Pasteur method, which consists of drying the cord for a maximum of 14 days; the so-called Berlin method as modified in the Hygienic Laboratory, in which the cord is dried for a maximum of 8 days; the dilution method of Högyes, in which carbolized virus is used; and the desiccated virus of Harris.

The method in use at the Hygienic Laboratory, in which the cord is dried for a maximum of 8 days, has been extensively copied in the United States; but, on account of the long period over which the treatment extends (21 days), the desirability of finding some method in which the period of treatment could be shortened has been apparent. For this reason Passed Asst. Surg. Hasseltine was assigned the problem of investigating the comparative merits of other methods for the preparation of antirabic virus.

These studies were begun toward the end of the fiscal year, and will probably have to extend well into the next fiscal year. It is hoped that results of a positive character may finally be obtained.

Typhus fever.—The announcement by Plotz at the close of the last fiscal year of the cultivation of the organism of typhus fever from cases of so-called "Brill's disease," or mild typhus, and cases of typhus fever seen at the New York quarantine, excited much interest among the workers at the Hygienic Laboratory. Plotz has reported in the fiscal year just ended his complete results, and it would

appear that he has probably been successful in the cultivation of the organism of typhus fever.

Efforts to obtain access to cases of typhus fever in order that these results might be considered have been without avail.

Attempts are now being made, however, to grow the organism of typhus fever from the strain of virus which has been maintained by passage from guinea pig to guinea pig at the laboratory since September 20, 1911. During this time this strain of the virus has apparently not changed in respect to its virulence or infectivity.

Distribution of antityphoid vaccine.—There were administered at the Hygienic Laboratory in the fiscal year 1915, 480 doses of antityphoid vaccine to Federal employees located in the District of Columbia. In the same period 15,468 1-c. c. ampuls and 178 10-c. c. ampuls of antityphoid vaccine were sent from the laboratory, mostly for the use of beneficiaries of the service and Federal employees engaged in interstate commerce, thus making a total of 17,248 doses.

In the latter part of the fiscal year additional necessary materials for the further extension of this service were purchased. This vaccine has been prepared without any increase in the personnel of the laboratory, most of it having been prepared under the immediate supervision of Passed Asst. Surg. Hasseltine.

Distribution of cultures.—The laboratory has received during the year an increasing number of requests from laboratory workers in various parts of the United States, as well as abroad, for cultures of organisms. These cultures, wherever possible, except in the case of the organisms of plague and cholera, have been supplied.

Examination of specimens.—During the past fiscal year there has been an increasing use made by officers of the Public Health Service of the facilities of the laboratory by sending specimens of various kinds for examination and report. There was a total of 1,788 specimens received from various sources for examination. These comprise:

Blood:

Wassermann test—

Positive.....	104
Negative.....	296
Anticomplementary.....	19
Specimens not satisfactory.....	16
	435

Malaria.....	7
Widal test.....	87
Anthrax.....	3
Count.....	4
	536

Tissues.....	61
Feces.....	139
Urine.....	50
Sputum.....	18

Animal heads:

Positive for rabies.....	62
Negative for rabies.....	59
Condition unsatisfactory to examine.....	18
	139

Water.....	734
Miscellaneous.....	111

Total..... 1,788

Disinfectants.—Further use of the Hygienic Laboratory method for the standardization of disinfectants has shown the great utility of this method and its advantages in many respects over the other methods employed for this purpose. Since January the nurse attached to the laboratory has been making examinations of disinfectants and during that time has examined over 100 samples, most of which were prepared in the division of chemistry in connection with the investigation of a method for the preparation of a cheap and efficient nonproprietary disinfectant.¹

While the Hygienic Laboratory method has given general satisfaction, it is believed that it may be possible to simplify the method somewhat and increase its utility. Some work along these lines is being done in cooperation with a committee of the American Public Health Association.²

Sterilization of dental instruments.—At the request of several dental associations, an investigation was undertaken in the laboratory and assigned to Passed Asst. Surg. Hasseltine on methods for sterilization of dental instruments. The results of the studies show that it is possible to sterilize dental instruments without serious injury to them and that this sterilization will reduce to a minimum the possibility of transmitting disease when the instruments are used. The results of these studies are embodied in Hygienic Laboratory Bulletin No. 101.

Tests of biological products.—An improved method has been devised for testing the sterility of viruses, serums, toxins, and analogous products. It is expected that this method and the preparation of tetanus toxin will be the subjects of papers for publication in the near future. The Hygienic Laboratory method of preparing tetanus toxin is now in general use in the United States and has proved of great value in consequence of the recent increased demand for tetanus antitoxin.

DIVISION OF ZOOLOGY.

In addition to the field activities of the division of zoology carried on under the direction of Prof. C. W. Stiles, chief of division, and specially mentioned elsewhere under appropriate headings in this report, important matters of routine have received attention.

International Commission of Zoological Nomenclature.—Cooperation with the International Commission on Zoological Nomenclature, referred to in preceding reports, has been continued, Prof. Stiles serving as secretary of the commission.

An important opinion has been issued by the commission which has direct bearing on several generic terms in common use in medical writings. This opinion (No. 66) definitely places the following names on the "Official list of generic names" authorized by the Graz International Congress:

Ancylostoma Dubini, 1843a, 5-13 (spelling as emended by Creplin 1845a, 325), type species *A. duodenale* (type host, man; type locality, Italy). This generic name is to be confined to hookworms of the Old World type. With this decision the following variants in spelling became obsolete and should be eliminated from future medical and zoological writings, except in tables of synonymy: *Achy-*

¹ See p. 94.

² See p. 96.

lostoma, Agchylostoma, Anchilostoma, Anchylostoma, Anchylostomia, Anchylostomos, Anchylostamum, Anchylostomum, Anckylostomum, Ancylostomom, Ancylostomum, Ancylostormum, Anghylostoma, Anhylostoma, Anklystomum, Ankylostemum, Ankylostoma, Ankylostomum, Anquilostoma, Archilostoma.

Ascaris Linnaeus, 1758a, 644, 648, type species *A. lumbricoides* (type host, man; type locality, Europe). The following synonyms and variants are to be eliminated from literature: *Ascoria*, *Askaris*, *Fusaria*, *Lombricoides*, *Stomachida*.

Dracunculus Reichard, 1759, 12, type *D. medinensis* (type host, man). This generic name is retained for the Medina worm, frequently called *Filaria medinensis*. The generic name *Filaria* belongs to worms of a different type.

Gnathostoma Owen, 1836f, 123-126, type species *G. spinigerum* (type host, the tiger).

Necator Stiles, 1903l, 14, type species *N. americanus* (type host, man; type locality, United States of America). This generic name is adopted for hookworms of the New World type—the common hookworm of man in North America.

Strongyloides Grassi, 1879f, 497, type species *S. intestinalis*=*stercoralis* (type host, man). The names *Anguillula intestinalis*, *A. stercoralis*, *Leptodera intestinalis*, *L. stercoralis*, *Pseudorhabditis stercoralis*, *Rhabdonema strongyloides*, and *Rh. intestinale* are to be eliminated.

Trichostrongylus Looss, 1905o, 413-417, type species *T. retortaeformis* (type host, *Lepus timidus*; type locality, Europe).

Gordius Linnaeus, 1758a, type species *G. aquaticus* (free form; type locality, Europe).

Paragordius Camerano, 1897g, 368, 399-402, type species *P. varius* (type locality, United States of America).

The work of establishing an international list of this kind progresses, of necessity, very slowly, but it will eventually result in eliminating thousands of useless technical names from scientific and medical literature.

Index catalogue of medical and veterinary zoology.—The work on this catalogue was somewhat interrupted by circumstances, but the volume on the Nematoda and Acanthocephala will be ready for press this coming fiscal year.

Determination of zoological specimens.—With the improved instruction in medical zoology in so many American medical schools, physicians are becoming more and more independent of the special laboratories for determination of the common parasites. Specimens of the less common forms still continue, however, to come to the division for determination.

*Oil of chenopodium in hookworm disease.*¹—Owing to the disturbance of the thymol market because of the European war the division of zoology began a study of the use of oil of chenopodium in cases of hookworm disease at the marine hospital in Wilmington, N. C. Upon news of three deaths in another State following the use of oil of chenopodium these studies were temporarily suspended pending further pharmacological knowledge of this drug. So far as the studies went oil of chenopodium was found to have certain distinct advantages over thymol in that it expelled both hookworms and *Ascaris*, it was preferred to thymol by the patients, produced no serious effect, and by shortening the term of treatment it proved more economical from a standpoint of hospital administration.

Failure of treatment with sulphur.—On account of some rather encouraging results in the use of sulphur in cases of infections with parasitic amebæ and with *Strongyloides stercoralis* sulphur was tried on hookworm disease, but it proved an absolute failure.

¹ See p. 92.

Endamoeba gingivalis and *pyorrhea*.—Considerable interest has been aroused this past year in the publication of several medical papers which tend to support the view that a parasitic protozoon, *Endamoeba gingivalis*, is an important factor in pyorrhea. This parasite has been known for many years to be more or less common in the human mouth, but it has not been viewed as of medical importance.

The division of zoology has begun a study of the subject in co-operation with the dental department of St. Elizabeth's Hospital (the Government Hospital for the Insane). The only points that it is deemed wise to report upon at present are the following: The parasite was present in every person thus far examined with sufficient care; it may vary in numbers in one and the same person on different days, being very numerous one day and very difficult to find a few days later; it is found not only in the pockets, but also free on the gums and on the teeth, and it has been especially numerous in the soft detritus in an especially foul mouth; its large amount of ectoplasm, as compared with the endoplasm, gives rise to the question whether it may not be a factor in forcing a passage into which pathogenic bacteria may gain entrance; it is striking that despite the hundreds of specimens examined, stages have not yet been observed by the division of zoology that could be positively interpreted as stages of reproduction; no evidence has been found that indicates that this species, *E. gingivalis*, has specific relations with *E. histolytica*.

DIVISION OF PHARMACOLOGY.

The activities of the division of pharmacology, which has been continued in charge of Prof. Carl Voegtlin, have related to a number of broad public-health problems, chief of which is the origin and treatment of pellagra. Some of the studies of this last-mentioned subject have been conducted at the Hygienic Laboratory, but the main studies have been done at the pellagra hospital, Spartanburg, S. C. The following is an account of the regular division work:

Standardization of drugs.—Work on the physiological standardization of commercial preparations of pituitary extract was continued. The results obtained during the previous year were fully confirmed on some additional preparations. It was found that the preparations on the market varied greatly in strength. The use of a chemical standard was therefore suggested by means of which it is possible to obtain preparations of constant physiological activity.

Digitalis.—A large number of digitalis preparations were examined according to the method adopted by this laboratory in previous work on digitalis. A variation of over 250 per cent in physiological activity was found to exist in the commercial preparations of fat-free tinctures of digitalis and a variation of 150 per cent in the samples of commercial digitalin. The claim of the manufacturers that the first-mentioned preparations are not subject to deterioration within a reasonable length of time was disproved, as a marked degree of deterioration was found in some of the samples of fat-free digitalis after having been kept under ordinary conditions for from five to six months. The use of acceptable physio-

logical methods and the adoption of a standard of activity by all manufacturers was suggested as a means whereby greater uniformity may be expected in the activity of commercial preparations of digitalis.

Thyroid standard.—The committee of revision of the United States Pharmacopœia has adopted the iodine standard for the official thyroid preparations, mainly on the basis of some recent work of this division on the variation of the iodine content of the thyroid gland.

Absorption and excretion of thymol.—In connection with the widely used thymol treatment of hookworm disease, the absorption of this drug from the gastrointestinal canal and its excretion from the body were studied. Contrary to the prevalent belief that thymol is not absorbed to any extent, it was demonstrated that thymol does not appear in the feces and that it must therefore be completely absorbed from the intestine. From 50 to 60 per cent of the drug, administered by mouth, could be recovered from the urine of animals and patients by means of a new method for the detection of this drug. The common assumption that an increase in the fat content of the food favors the absorption of thymol was disproved.

As a result of the European war the thymol supply was temporarily much reduced. An article was therefore published in the Public Health Reports calling attention to the use of oil of chenopodium as a substitute for thymol in the treatment of hookworm disease.¹

Toxicity of aluminium salts and presence of aluminium salts in food.—Additional analyses of the ordinary foods for their content in soluble aluminium salts were made. It was found that almost all vegetable foods contain small quantities of aluminium. The continued administration of aluminium salts to animals leads to nephritis with the appearance of albumin in the urine. The question as to whether the quantities of aluminium salts consumed by man have any deleterious effect upon the body is still left open.

Toxicity of drugs.—Studies are also being made of the untoward or secondary action of drugs and an index of the literature relating to the subject is being compiled. During the year two articles bearing on this subject entitled "Drug intoxication, an economic waste and a menace to public health," and "The limitation of self-medication" were published in the Public Health Reports and issued Reprints Nos. 227 and 256, respectively.

Examination of drugs.—A considerable number of samples of various kinds were analyzed or examined as to their physiological activity. These included drugs received from the purveying depot to determine whether they conformed to the pharmacopœia standards; tetanus antitoxin, pathological specimens; various proprietary medicines.

Toxicity and chemotherapeutic action of the heavy metals.—A systematic study of the toxicity of various organic preparations of the heavy metals was in progress during the last year. This investigation represents the first systematic study of this kind. A large number of compounds were synthesized in the laboratory and tested on various species of animals for their toxicity. Data of this character

¹ See Public Health Reports, Oct. 2, 1914, p. 2651.

are only available to a very limited extent in the literature and the present investigation will furnish valuable information, which might be of use in general toxicological work and in toxicological problems of industrial hygiene in particular. Metal poisoning is an important phase of this last-mentioned science. All of the common metals and most of the rare metals (31 in number) have been under investigation. Besides this, most of these compounds were tested as to their curative action on animals infected with trypanosomes. This investigation is nearing completion and the results will be published in the near future.

Digest of Comments on the Pharmacopœia of the United States and on the National Formulary.—The preparation of material for the Digest of Comments has been continued and during the year Hygienic Laboratory Bulletin No. 98, including a compilation of the comments for the calendar year ending December 31, 1913, was prepared, printed, and distributed. An additional volume, for the year ending December 31, 1914, will be published as Hygienic Laboratory Bulletin No. 105. These bulletins continue to be favorably commented on in the pharmaceutical and chemical literature not only of this country but also of foreign, even non-English-speaking countries.

United States Pharmacopœia revision.—The cooperative work in connection with the revision of the Pharmacopœia of the United States and the National Formulary has been continued during the year, and both of these books are now in press. Nearly 300 pages of proof for the Pharmacopœia have already been corrected and it is expected that this book will be available for distribution before the end of the present calendar year. One member of the division is also a member of the committee on National Formulary and of the committee on nonofficial standards for drugs and medicines, the two committees directly responsible for the revision of the National Formulary. This book, it is expected, will be published simultaneously with the Pharmacopœia of the United States.

In connection with work of the council on pharmacy and chemistry of the American Medical Association, which is making efforts to correct some of the many abuses existing at the present time in connection with drug therapy, the members of the division have assisted in the compilation and revision of the book, *New and Nonofficial Remedies*, which was published in January, 1915, and are now at work on a revision of the list of "Useful drugs," a publication of the council adopted as a foundation for instruction in medical schools and as a basis for examination by State examining and licensing boards in materia medica subjects.

DIVISION OF CHEMISTRY.

The work of the division of chemistry has consisted of laboratory investigations and scientific work connected with field studies of sewage disposal and industrial waste. Prof. E. B. Phelps, in charge of the division, has acted also as sanitary advisor to the international joint commission.

Laboratory work.—The work of the laboratory proper has been under the supervision of Sanitary Chemist Albert F. Stevenson. The routine work has comprised the examination and analysis of

sewage effluents and industrial wastes in collaboration with field investigations; examinations of the Washington City sewage and of samples of water from the Potomac River in connection with the Potomac River investigation; examinations of drugs and other preparations for the purveying depot; examinations of match materials for the Office of Commissioner of Internal Revenue; miscellaneous examinations and analyses; preparation of solutions and reagents and incidental work of a chemical nature in connection with other divisions of the service, field investigations, and work of the divisions of the Hygienic Laboratory. There have been examined 903 samples of water, sewage, and industrial wastes; 29 drugs and other preparations; 8 specimens of match material; 149 samples of milk, and 45 specimens of a miscellaneous character.

In addition to the routine analytical work the following special investigations have been carried on from time to time during the year.

Relations between rate of heat loss from a moist, warm body at 37° C. and temperature, humidity, and velocity of movement of the surrounding air.—The experimental portion of this investigation was completed in Boston during the previous year and furnished a large mass of data which required an elaborate mathematical analysis for its proper presentation. This work has been completed and is now in final form. The relation as finally formulated furnishes a fundamental physical basis for a further discussion of the general ventilation problem.

Skin temperature and humidity between skin and clothing.—The determination of these two physical values is essential in any discussion of the dissipation of body heat from the human body, which, in turn, is a fundamental factor in ventilation work. Considerable attention has been given to the development of apparatus for this purpose. This work has thus far not been wholly successful and is being continued along new lines.

Disinfectants.—Work on the preparation of a cheap and efficient disinfectant has been continued as time permitted throughout the year. Some determinations on the keeping qualities of pine oils, prepared disinfectants, and final water emulsions have developed unexpected difficulties in that there appears to be a constant deterioration in the oil itself after distillation. The nature of the problem has made it impossible to hasten the work and the difficulties presented have necessitated a thorough study of various commercial pine oils, both freshly distilled and of various ages, with a view to the determination of the true cause of the results noted and, if possible, of a remedy therefor. It has been found that redistillation of the old oils restores the initial high germicidal properties. This work is practically completed.

Determination of minute quantities of metals of the copper and arsenic groups.—An investigation into the chemical composition of materials entering into the manufacture of enamel kitchen ware and an independent investigation of copper and other metallic content of oysters both indicated the necessity for more delicate and reliable methods for determining copper, arsenic, and antimony in minute quantities when mixed with relatively large quantities of other metals of these two groups. A complete study of this whole matter

was therefore undertaken and a satisfactory method of separation and analysis under these conditions has been developed which is far more sensitive and reliable than any method hitherto available. The work of the original investigation will now be proceeded with.

Diffusion coefficient of dissolved oxygen in water at various temperatures and degrees of salinity.—This fundamental physical constant is of direct interest and value in connection with stream pollution and studies on the self-purification of streams. Its determination involves a most elaborate apparatus, the construction of which has necessitated many special studies. The apparatus has been completed and active experimental work upon the primary problem is under way.

Determination of mineral contents of water by methods of electrolytic conductivity.—The development of a simple and rapid method for the so-called mineral analysis of water would greatly simplify this somewhat laborious process and encourage the making of more frequent analyses of this kind. An attempt has been made to apply the principles of electrical conductivity to this problem with a measure of success, with the crude apparatus available, which justifies the construction of more perfect and elaborate apparatus. The latter is now being constructed and certain essential electrical measuring devices are being provided.

Determination of volatile sulphide in sewage and sewage effluents.—This important chemical determination, which has a direct bearing upon sewage disposal problems, both as a measure of results obtained and an index of the type of biochemical processes at work, has not hitherto been utilized because of its inherent difficulties. An investigation of the analytical procedures has led to the development of a simple and satisfactory technique which readily furnishes the desired information. This technique will be furnished to the committee on standard methods of water and sewage analysis, American Public Health Association, for use in the compendium of standard methods issued by that association.

Nitrates in sewage filter effluents.—While satisfactory methods exist for nitrate determination in water, these methods are of no avail in sewage and present methods of use are both time consuming and unsatisfactory. A new method depending upon the oxidation of the organic compound O-Tolidine has been developed and submitted to systematic test and has been found to satisfy all the requirements of a rapid and accurate method under all the various complicating conditions of sewage analysis. This method will likewise be made available to the committee on standard methods of the American Public Health Association.

Cooperative work with the committee on standard methods of water and sewage analysis, American Public Health Association.—The division chief, as chairman of a subcommittee on dissolved oxygen, has organized a cooperative study of various current methods for the determination of dissolved oxygen in water and submitted a report to the parent committee recommending certain changes in the existing standard method. Some cooperative work was also done at the laboratory for the subcommittee on stability and oxygen demand of sewage and sewage effluents, the results of which work were transmitted to the chairman of that committee and have formed a portion of his report to the general committee.

Cooperative work with committee on standard methods of testing disinfectants, American Public Health Association.—As chairman of the above-named committee the chief of the division has arranged the details of a cooperative test of the existing Hygienic Laboratory method and the Rideal-Walker method under various laboratory conditions. This work has been undertaken by five cooperating laboratories, including the Hygienic Laboratory, and data of the first set of results are now being compiled and analyzed with a view to determining the causes of any discrepancies noted.¹

VIRUSES, SERUMS, TOXINS, AND ANALOGOUS PRODUCTS.

In the enforcement of the law of July 1, 1902, regulating the sale of viruses, serums, etc., 46 inspections of establishments were made, 21 licenses were renewed, and 3 new licenses and 4 supplemental licenses issued. Three licenses were revoked and 10 suspended for various causes. In 8 cases applications for licenses were refused, and 4 other establishments withdrew their applications. There were 41 establishments (26 American and 15 foreign) holding licenses at the end of the fiscal year.

During the year a total of 3,102 samples of products were examined in connection with the administration of the law, an increase of 178 per cent over the number examined last year.

The American standard unit of diphtheria antitoxin has been prepared in the Hygienic Laboratory for distribution and tested at regular intervals of two months. A new supply of tetanus toxin has been prepared and stored under standard conditions. It is expected that this will suffice for the standardization tests in all countries at present using the American unit of tetanus antitoxin for 12 years.

One hundred and seventy-one portions of standard diphtheria antitoxin were sent out to firms or individuals in the United States and 34 portions were sent to foreign countries where were located firms desiring license for the sale of diphtheria antitoxin in the United States, this being a total of 205 lots. Twenty-nine portions of tetanus toxin were sent to domestic manufacturers and eight portions to foreign firms.

Not only is the Hygienic Laboratory method for the standardization of tetanus antitoxin in general use in the United States, but it is also used by the largest firm manufacturing antitoxin in England, by the Colonial Laboratory in Java, and officially in Belgium. Information recently received is to the effect that recommendations for its official use have been made in Italy, and that its adoption is being considered by the official Russian laboratories and the Japanese Serum Institute.

Labeling tetanus antitoxin.—The bureau having received information that in various cases packages of tetanus antitoxin sent abroad by licensed manufacturers failed to show on the label the date beyond which the products could not be reasonably expected to yield results, a letter was addressed to the various establishments inviting attention to the necessity of observing this provision of the law.

Foot-and-mouth disease.—On account of the outbreak of foot-and-mouth disease in certain sections of the United States, a communica-

¹ See p. 89.

tion was addressed to all the manufacturers of vaccine virus recommending that the greatest possible care should be taken to observe the regulations governing the quarantining of animals and their examination and supervision by qualified veterinarians.

Violation of law punished.—Reference was made in the last annual report to the prosecution of a St. Louis concern for selling so-called Piorkowski tuberculin in violation of the law. On November 27, 1914, the defendant, one Leslie A. Knight, using the name "The Piorkowski Laboratories," pleaded guilty to having made a shipment of so-called turtle tuberculin without due compliance with the law, and was fined \$100 and costs.

Purity of vaccine virus.—During the year studies on the relation of vaccine virus to certain cases of tetanus occurring two to three weeks subsequent to vaccination have been given attention by the Director of the Hygiene Laboratory, and the results have been embodied in a paper which has been published in the Public Health Reports.

The studies included the examination of a large amount of vaccine virus specifically for the presence of tetanus bacilli. Virus sufficient for the vaccination of over 2,000,000 persons has thus been examined in the last 13 years in the laboratory, and in no instance was it possible to demonstrate the presence of the tetanus organism or its toxin in the vaccine.

Inquiry of the manufacturers of the virus used showed that for the 11 years from 1904 to 1913, inclusive, they disposed of over 31,000,000 doses of vaccine virus, and it was possible to obtain information of but 41 authentic cases of tetanus developing after vaccination during that time. The Surgeon General of the United States Army and the Surgeon General of the United States Navy stated that there were 585,000 soldiers and sailors vaccinated from 1904 to 1913, and that during that time there were but six cases of tetanus in the Army and two in the Navy, in none of which was there the least reason to believe that the disease had any relation to vaccination.

In the 41 cases of tetanus occurring after vaccination that were investigated it was found that the incubation period, counting from the time of vaccination to the onset of tetanus, was 22 days. Twenty-nine of the cases resulted fatally, thus giving a case mortality of 70.7 per cent. As the incubation period and case mortality, when compared with similar data for tetanus from other causes, point strongly to the probability of a true incubation period of 10 days or less, it is seen that the infection of tetanus was not received at the time of vaccination; that is, the organism was not in the virus, but the infection was acquired in some other way 10 days or more after vaccination.

The conclusion as a result of the studies was that cases of tetanus occurring 15 to 20 days after vaccination do not receive their infection through the vaccine virus, but that in all probability the infection is received about the tenth day or later after vaccination by contamination of the vaccination wound such as might occur in the infection of any other surgical wound not properly cared for.

In this study attention was also given to the possibility of the conveyance of other infections by vaccine virus. In one locality in the United States where poliomyelitis was prevailing the charge

was brought by certain persons that some cases of poliomyelitis received their infection at the time of vaccination. This is extremely improbable for several reasons, one of the most important of which is that we know the bovine species (from which vaccine virus is made) is not susceptible to the infection of poliomyelitis, and that therefore it does not seem possible that the infection of poliomyelitis could be associated with vaccine virus, as has been shown to be possible with foot-and-mouth disease. Moreover, the slight scarification in vaccination would hardly afford a sufficient avenue for the infection of infantile paralysis.

ANTINARCOTIC LEGISLATION.

The number of drug habitués in the United States has been variously estimated at from 100,000 to 4,000,000. In view of the fact, however, that the number is necessarily limited by the amount of the available material, it can not well reach even 10 per cent of the maximum figures quoted. A survey made by a special committee of the American Pharmaceutical Association in 1902 seems to indicate that there are in the United States perhaps 200,000 persons addicted to the habitual use of narcotic drugs, like opium, coca, their alkaloids and derivatives.

It is obvious that drug addiction has reached gigantic proportions in this country, and constitutes at present one of the most serious problems before the people of the United States.

While much if not all antinarcotic legislation has been placed on the statute books during the last 20 years, yet many of these laws, on account of constructive defects, are practically unenforceable. In addition, it has been found nearly impossible to locate deviations of narcotic drugs from the legitimate channels of trade to illicit traffickers, and State laws have been actually unenforceable because of the difficulty of securing records of sales. With a view to remedying this fault, Congress enacted on December 17, 1914, the so-called Harrison law, effective March 1, 1915, requiring the registration of persons selling, dispensing, or giving away opium, coca leaves, and preparations thereof.

While this law is primarily a revenue measure enforceable by the Commissioner of Internal Revenue, the bureau has furnished, on request, assistance in interpreting technical questions relating to its enforcement.

It is expected that the new Harrison antinarcotic law will serve to furnish the information necessary to make existing statutes operative. It must be explained, however, that, while in itself an excellent measure, this act is not designed to and can not well stop the illicit traffic in cocaine or opium unless it is supported by effective State or local laws that are actually enforced.

In order to invite the attention of health officers and other persons interested to this matter a comparative analysis of existing Federal and State legislation relating to habit-forming drugs was made by Technical Assistant M. I. Wilbert. This study was published in the Public Health Reports and issued as Reprint No. 267.

Another article by Technical Asst. M. G. Motter on the effects of the enforcement of the Harrison law on drug addicts was also published in the Public Health Reports of April 2, 1915.

INVESTIGATIONS OF POLLUTION OF STREAMS.

The investigations of pollution of waters and sewage studies thus far conducted by the service have aimed at gaining accurate knowledge in regard to existing conditions and suggesting remedial measures whenever practicable. These investigations may be classified under the following headings: 1. Pollution of streams, under the supervision of Passed Asst. Surg. W. H. Frost; 2. Coastal waters, under the supervision of Surg. H. S. Cumming; 3. Sewage disposal and industrial wastes, under the supervision of Prof. E. B. Phelps. In addition a number of investigations have been made at the request of State and local authorities in regard to local problems of sewage-disposal and water-supply systems. During the year a close co-ordination was established among all these investigations and various conferences held by the officers in charge in order to standardize methods and increase the efficiency of the work.

Investigations of the pollution of streams during the past fiscal year have comprised:

1. A continuation of studies of the pollution of the Ohio River begun in the preceding fiscal year.

2. An extension of the Ohio River investigation to include: (a) A critical study of the municipal filtration plants of Cincinnati and Louisville, with reference to their purification of the Ohio River water, and (b) a general survey of the status of stream pollution on the watersheds tributary to the Ohio.

3. The beginning of a survey of the status of stream pollution upon Atlantic coast watersheds.

These investigations have been carried on from headquarters at Cincinnati, Ohio, under the direction of Passed Asst. Surg. W. H. Frost. Prof. E. B. Phelps has been intimately associated in an advisory capacity with the studies of the pollution of the Ohio River since their beginning.

OHIO RIVER.

The object of this investigation, as more fully outlined in the last annual report, has been not only a study of pollution conditions as existing in the Ohio River, but at the same time and more especially a quantitative study of the factors entering into the pollution and self-purification of streams in general. Since the investigation relates primarily to the public health, the phase of stream pollution which is of the greatest public-health importance, namely, excremental pollution, has been most emphasized; and studies of the natural agencies of purification have been directed primarily toward their influence upon the life of sewage bacteria in river water. Also, special attention has been devoted to an epidemiologic study of the communities situated upon the river, to ascertain the extent to which the public health is affected by existing stream-pollution conditions.

The coordinated studies comprised in this investigation may be grouped as follows:

1. Laboratory studies, comprising extensive bacteriological, chemical, and biological (plankton) examinations of samples of water collected at regular intervals from sampling stations in critical stretches of the Ohio River and from some of its main tributaries.

2. Hydrometric studies, comprising measurements and estimates of the discharge and velocity of the river in various stretches throughout its course.

3. A sanitary survey of Ohio River cities and villages.

Organization.—At the beginning of the fiscal year 1915, the organization was as follows: Administrative headquarters and main laboratory at Cincinnati, Ohio; five branch laboratories at Pittsburgh, Pa., Wheeling, W. Va., Portsmouth, Ohio, Louisville, Ky., and Paducah, Ky., respectively; one field party, detailed from the United States Geological Survey, engaged upon hydrometric studies; two field parties engaged upon a sanitary survey of Ohio River cities and villages.

The personnel consisted of the following: Five medical officers, 1 pharmacist, 3 sanitary engineers, 1 special expert (biologist), 1 district engineer and 1 junior engineer of the United States Geological Survey, 10 sanitary bacteriologists, and 22 attendants.

Upon reduction of the scope of laboratory work, October 15, 1914, and upon the completion of the field work of the hydrometric and sanitary surveys, the personnel of the station was reduced by the transfer of three medical officers and three sanitary bacteriologists, the resignation of three additional sanitary bacteriologists, and the discontinuance of attendants employed at the four laboratory stations which were closed at that time. The junior engineer of the United States Geological Survey had previously been detached. District Engineer C. E. Ellsworth, of the same service, was continued upon his assignment until the compilation of the data collected by him had been completed, in February, 1915. The remaining personnel were engaged during the winter in carrying on laboratory work at Cincinnati and at Louisville and in the compilation of the data already collected. At the close of the fiscal year the bulk of the data had been compiled, ready for final analysis.

To enable the reextension of field work in the spring of 1915, the personnel of the investigation was again increased by the reassignment of three assistant surgeons and one sanitary chemist. During June one sanitary engineer and two sanitary bacteriologists were also assigned to the station at Cincinnati for duty in connection with an investigation of industrial wastes.

Laboratory work.—The laboratory studies, as organized at the beginning of the fiscal year, were carried out at the main laboratory in Cincinnati, the five stationary branch laboratories, and one houseboat laboratory.

At each laboratory samples were collected daily by motor launch during the period covered by laboratory studies from fixed sampling stations on the Ohio River and such of its tributaries as were accessible. The schedule from May 1 to October 15, 1914, included sample collections regularly, either three or six times weekly, from 25 carefully selected sampling stations on the Ohio River between Pittsburgh and Cairo. At each of these sampling stations samples were taken at mid depth from three points upon a cross section in order to give a fair average sample of the river. Collections were also made daily or on alternate days from sampling points near the mouths of the following tributaries: Allegheny, Monongahela, Beaver, Scioto, Little Miami, Licking, Great Miami, Cumberland,

and Tennessee; and occasional samples were taken from the Muskingum, Little Kanawha, Hocking, Great Kanawha, Big Sandy, and Guyandotte. Beginning about August 1, 1914, collections were made twice weekly from the Kentucky River at its mouth, and from an additional sampling station on the Ohio River* just above the mouth of the Kentucky.

Beginning early in July, 1914, samples for bacteriological examination only were taken at regular intervals, once or twice weekly, from the public water supplies of practically all municipalities having more than 2,500 inhabitants between Pittsburgh and Cincinnati. These samples were, for the most part, collected by messengers sent out from the laboratories at Pittsburgh and Wheeling, the remainder being collected and forwarded to the various laboratories by local sample collectors employed in cities not accessible to messenger. By this arrangement examinations of the water supplies of 56 Ohio River municipalities were made regularly during a period of three months. The water supplies of Pittsburgh, Cincinnati, Louisville, and several other cities which are included in the above number were examined daily for a considerably longer period than three months.

In the houseboat laboratory examinations were made of the public water supplies of all municipalities between Cincinnati and Cairo. It was possible, however, to extend these examinations only over the period during which the houseboat laboratory was in the vicinity of each town: that is, from three to seven days. In this laboratory samples from the Ohio River and its tributaries at points intermediate between the fixed sampling stations were also examined.

Bacteriological studies.—All samples collected from the river stations and from municipal supplies have been examined bacteriologically; the routine examination, including total bacterial counts on gelatin at 20° and agar at 37°, with quantitative tests for bacteria of the *Bacillus Coli* group. These examinations have been made in each instance at the laboratory from which the collections were made, and it has been possible in all cases to have the samples, carefully iced in warm weather, delivered to the laboratory within a few hours after collection.

In addition to the routine examinations above mentioned additional bacteriological work has been done at the Cincinnati laboratory in the identification of cultures isolated at the branch laboratories in connection with determinations of *Bacillus Coli*, such cultures having been forwarded weekly to the main laboratory at Cincinnati. Also, at this laboratory a number of special bacteriological researches have been conducted, mostly with reference to the efficiency of various procedures in the bacteriological examination of water.

Chemical studies.—The chemical studies have included turbidity, alkalinity, and dissolved oxygen determinations, made daily at each branch laboratory, and more extended sanitary and mineral analyses made at Cincinnati upon samples collected weekly or semiweekly at the branch laboratories and forwarded to the main laboratory for analysis. Turbidity determinations which are of special importance in the studies on sedimentation and "scour" have been made on all samples collected for bacteriological examination. Alkalinity deter-

minations have been made only on samples from one or two of the Ohio River sampling stations at each laboratory and on all samples from tributaries. The studies of alkalinity have been of special importance and interest in the vicinity of Pittsburgh and Wheeling, where there is considerable pollution with acid-iron and coal-mine wastes, markedly affecting the biology of the river. Dissolved oxygen determinations have been made daily on freshly collected and incubated samples from practically all river sampling stations, following plans laid out by Prof. Phelps for a comprehensive study of the extent and rate of oxygen depletion and renewal in the stream. These dissolved oxygen studies have constituted the most extensive and probably the most important phase of the chemical work in this investigation.

Plankton studies.—A survey of the plankton life of the river, a phase of study which is assuming increased importance in stream pollution investigations, was barely begun at the first of the fiscal year but was rapidly developed during July to its full scope. For the purposes of this study, samples of water and of river-bottom sediment have been collected at intervals of one to two weeks from a large number of selected sampling points in the vicinity of the various laboratories and forwarded to Cincinnati for examination by the biologist of the investigation. The number of biological samples collected during the period of intensive work, from July to October, inclusive, was so great that it has been necessary to devote practically all the remainder of the year to their study.

Work upon this schedule of laboratory studies was continued until October 15, when the laboratories at Pittsburgh, Wheeling, Portsmouth, and Paducah were discontinued. The laboratories at Cincinnati and Louisville were continued in operation for an intensive study of the important stretch of river between these two cities and also to note the effect of winter conditions upon the biology of the river. At these two stations the schedule of work carried on through the summer was continued through the winter months without material change and fortunately without serious interruption on account of severe weather.

Laboratory examinations.—Following is a summary of the laboratory examinations made during the course of the year, exclusive of examinations made in the course of special investigations not included in the regular schedule of work:

Summary of laboratory examinations.

Bacteriological examinations	15, 278
Chemical examinations:	
Turbidity determinations	¹ 15, 000
Alkalinity determinations	¹ 3, 000
Dissolved oxygen determinations	17, 588
Sanitary analyses	¹ 850
Mineral analyses	¹ 120
Biological (microscopic) examinations:	
Of water samples	² 520
Of mud samples	² 313
Of miscellaneous samples	² 28

¹ Figures are approximate. Records not yet assembled sufficiently to be fully checked.

² Figure represents number of samples. Each sample often requires a series of examinations.

Hydrometric survey.—A hydrometric survey of the Ohio River was begun in May, 1914, by District Engineer C. E. Ellsworth, of the United States Geological Survey, assigned by the Director of the Geological Survey to cooperate with the Public Health Service in this investigation. Subsequently Junior Engineer R. M. Adams, United States Geological Survey, was assigned to assist Mr. Ellsworth. The field work of this survey was continued until November, 1914, during which time the hydrometric data available from various sources were assembled.

Additional stream flow and velocity measurements were made at several previously established stations upon the Ohio River, and new gauging stations were established on the Beaver, Scioto, Miami, Little Miami, and Licking Rivers, where measurements were taken sufficient to form the basis of estimates of the discharge of these tributaries. Upon the completion of the necessary field work the compilation of data was undertaken by Mr. Ellsworth and Sanitary Engineer H. W. Streeter, the work being done partly in the offices of the United States Geological Survey at Washington and partly at this station. Their compilations, completed about February 1, 1915, give provisional estimates of the daily discharge of the Ohio River at all sampling points and of the following tributaries: Allegheny, Monongahela, Beaver, Scioto, Little Miami, Licking, Great Miami, Kentucky, Wabash, Tennessee, and Cumberland. Careful estimates were also made of the average daily and monthly velocities of the Ohio River between consecutive sampling points from Pittsburgh to Cairo. The preparation of these estimates of velocity was a laborious work, but thoroughly justified by its importance in connection with the laboratory studies of stream pollution. The compilations of discharge and velocity so far prepared cover only the period from December 1, 1913, to October 15, 1914; but, with the data at hand, practically all of these estimates can be extended to subsequent periods with comparatively little difficulty.

Sanitary survey of Ohio River communities.—A sanitary survey of Ohio River cities and villages was begun in May, 1914. Two field parties were assigned to this survey, one to the territory from Pittsburgh, Pa., to Cincinnati, Ohio, the other to that between Cincinnati and Cairo, Ill. The survey of the lower river was completed early in October, and that of the upper river in November, 1914. The three metropolitan cities on the river, Pittsburgh, Louisville, and Cincinnati, were omitted from the detailed survey for the reason that the requisite data in regard to these cities are available from local records. Also, the surveys of a few villages in the immediate vicinity of Cincinnati and Louisville have not yet been completed. With these exceptions, the survey has covered all incorporated towns directly upon the Ohio River and quite a number of small unincorporated communities.

In making this survey each community has been carefully studied from two main standpoints, namely, its contribution to the pollution of the river and the effect of existing stream pollution conditions upon the public health of the community itself.

Sewage and industrial wastes in these communities.—With reference to the first-named standpoint, namely, the pollution of the river, a careful survey has been made of the amount of domestic

sewage and the amount and character of industrial wastes discharged into the Ohio River from each community. These estimates have been made with the utmost care from data collected in each community from all available sources. The survey of industrial wastes has necessitated a visit to practically every important waste-producing industrial plant located on the river except in the metropolitan cities. No detailed survey of the domestic sewage and industrial wastes discharged from the metropolitan cities, Pittsburgh, Cincinnati, and Louisville, has been attempted, since these data are available with fair accuracy from local records, especially in regard to Cincinnati, where a careful survey of the sewage discharge of the city, undertaken by the municipal authorities, has recently been completed. Data relative to the discharge of acid wastes into the Ohio and its tributaries in the vicinity of Pittsburgh have been furnished in part from the office of the United States district engineer in charge of the Pittsburgh district.

From the second standpoint of the survey, a careful study has been made, in each community, of sanitary conditions, especially as affected by pollution of the river. Since the most definite effect upon the public health attributable to stream pollution is the causation of typhoid fever by the use of polluted drinking water, the main object in this study has been to estimate the extent to which pollution of the river has been and is contributing to the prevalence of typhoid fever. This has necessitated, in each community, a careful study not only of the water supply, but also of other potential factors in the causation of typhoid fever; and the compilation of detailed morbidity and mortality records, often most readily available from local sources.

The work of the field party assigned to the survey of the upper half of the river, namely, Asst. Surg. L. R. Thompson and Sanitary Engineer R. E. Tarbett, was supplemented by the bacteriological examinations of municipal water supplies between Pittsburgh and Cincinnati, as previously mentioned. No such arrangement could be made for examination of the water supplies of communities between Cincinnati and Cairo, hence it was necessary to assign to this survey a party consisting of Asst. Surg. Liston Paine, Sanitary Engineer J. K. Hoskins, one bacteriologist, and one attendant, with headquarters in a house-boat laboratory, where water supplies were bacteriologically examined in the course of the survey. This laboratory also served for the examination of samples from the Ohio River and its tributaries at points intermediate between the fixed sampling stations.

WATERSHEDS TRIBUTARY TO THE OHIO RIVER.

A survey of the status of stream pollution on watersheds tributary to the Ohio River, begun in May, 1915, is a direct continuation of previous studies in the investigation of the pollution of the Ohio River, and at the same time constitutes the beginning of a comprehensive survey of stream pollution, which is planned to be extended to other parts of the country.

Two field parties have been assigned to this work, namely, Asst. Surg. L. R. Thompson, with Sanitary Engineer R. E. Tarbett, and Asst. Surg. Howard F. Smith, with Sanitary Chemist Jay A. Craven.

The two parties, though covering separate territories, are working in close coordination.

As in the survey of Ohio River cities during 1914, the pollution of each watershed is being studied from two main angles, namely, the amount and character of the polluting wastes discharged into each stream in relation to the size and character of the stream, and the effect of existing and anticipated stream-pollution conditions upon the public health. The two working parties assigned to this duty are conducting their surveys along the same general lines as were followed in the survey of Ohio River communities in 1914, with such modifications in detail as are necessary on account of the broader scope of the present survey and the more extensive territory to be covered.

The first step in each survey is the assembling of such data as are available from State boards of health and other State offices. These are then supplemented by visits to the more important centers of population on each watershed, including all cities of 10,000 population or more, and in many instances smaller cities. In each community visited a careful estimate is made of the amount and kinds of wastes discharged, together with a study of the prevalence of typhoid fever and of the factors contributing to its causation. The ultimate objective of this work is to assemble, for all the watersheds of the Ohio River basin, sufficiently uniform data to enable comparison of the various river systems with respect to the extent, effects, and control of their pollution. In all the States covered by this survey the State health authorities have given their cooperation, which is essential, since the survey in each State is built upon the previous work of the State as its basis.

ATLANTIC COAST WATERSHEDS.

A survey of Atlantic coast watersheds, similar in scope to that of the Ohio Basin, was begun in May of this year, with the assignment to this duty of a field party consisting of Passed Asst. Surg. Paul Preble and Sanitary Engineer J. K. Hoskins. This survey has been begun in the State of New Jersey, in order that the work may be co-ordinated with the investigations of the pollution of coastal waters being carried on along the New Jersey coast at the same time under the direction of Surg. H. S. Cumming.

This work, which is expected to be extended later to other territory, is fully coordinated with the survey of the Ohio River basin in such way that the data collected in the two surveys will be as nearly as possible comparable.

STUDY OF CINCINNATI AND LOUISVILLE FILTRATION PLANTS.

In connection with the continuation of intensive studies of the pollution and purification of the Ohio River between Cincinnati and Louisville, a critical comparative study of the public water supplies of these two cities, both derived from the Ohio River, was begun in May, 1915. By arrangement with the respective city authorities laboratories were established early in May in the municipal filtration plants at Cincinnati and Louisville for the study of the quality of the raw water available from the Ohio River at these two plants and the

degree of the purification effected by filtration. Similarly, practically parallel studies have, of course, been made by the managers of both these plants since their installation, but in undertaking this critical comparison of the plants it has been considered worth while to have the bacteriological determinations made by bacteriologists detailed from the staff of this investigation, using identical apparatus, culture media, and methods, in order to minimize such differences in bacteriological results as may be due to even slight differences in procedure.

The importance of this study lies in the fact that these two filtration plants, the largest upon the Ohio River, are in their construction among the best examples of modern mechanical filtration plants of the type considered to be best adapted to the purification of Ohio River water. Both plants are operated under the expert supervision of highly trained sanitary engineers of long experience, and it may be assumed that both in construction and operation these plants represent at least a near approximation to the highest efficiency which may reasonably be expected at this time in the purification of Ohio River water. The actual operation of these plants, therefore, may be taken as the best available measure of the present practicable efficiency and economy of purification of Ohio River water. A comparison of the two plants is of further importance and interest for the reason that the sewage of the Cincinnati metropolitan district is discharged into the Ohio River between the intake of the Cincinnati and Louisville plants, and it is obviously of importance to determine as precisely as possible what additional burden, if any, the discharge of this sewage imposes upon the Louisville filtration plant.

In order to establish the laboratory at the Louisville filtration plant it was necessary to discontinue the laboratory at the Louisville Marine Hospital May 6, transferring its personnel and equipment to the filtration plant. This latter laboratory is now utilized not only for studies of the filtration plant itself, but also, in coordination with the laboratory at Cincinnati, for the study of the purification of the Ohio River between Cincinnati and Louisville. The Cincinnati filtration plant laboratory was equipped from the main laboratory at Cincinnati without necessitating any reduction in the regular work at the latter station.

Sanitary Engineer H. W. Streeter has been assigned to directly supervise these studies, keeping in close touch with the operation of both plants and supervising the bacteriologic work.

Results.—As a result of the studies of stream pollution thus far made a large amount of data have been compiled and much of it analyzed. Several special studies have been completed. It is expected that all these data properly digested will be issued from time to time in the form of bulletins. The general studies will be continued.

WATER SUPPLY OF RUSSELL, KY.

In accordance with a request from the State Board of Health of Kentucky, Sanitary Engineer R. E. Tarbett was detailed to investigate the present water supply of Russell, Ky., and advise the authorities as to the securing of additional or new sources of supply. This investigation was made during April 15 and 16, 1915.

Russell is a town located on the Ohio River with a population of about 1,100 inhabitants, which has expended in the last few years about 20 per cent of its total valuation in street paving and the installation of public water supply and sanitary sewer systems. Its water supply is derived from drilled wells, supplemented by private wells and rain-water cisterns. At present, during some months of the year, the supply is not sufficient to meet the needs of the town, which, among other inconveniences, prevents the use of the sanitary sewers and increases the fire risks.

An examination of the water showed it to be, on account of the presence of large amounts of incrustants and free carbon dioxide, unsuitable for domestic and industrial purposes if used without treatment to remove these substances.

After giving careful consideration to the problem facing the town of obtaining a water supply adequate at all times for its needs and of such quality as to be safe and suitable for domestic purposes, it was recommended that a sanitary engineer be employed to study the possibility of locating wells in the bar at the mouth of Bears Run, on the Ohio River. Further recommendations were made for the construction of the wells, periodical examinations of the water, and its disinfection, if necessary.

WATER SUPPLY OF KNOXVILLE, TENN.

In compliance with requests from the city authorities of Knoxville, Tenn., and the secretary of the State Board of Health of Tennessee, Passed Asst. Surg. W. H. Frost was directed to make an investigation of the public water supply of Knoxville. The questions on which advice was desired concerned the character of the present water supply, need for improvements and their nature, and desirability of removing the intake from its present location.

After a preliminary investigation from December 19 to 24, 1914, and after conferring with the local authorities, it was decided by Dr. Frost that it would be necessary to establish a temporary laboratory in Knoxville to make examinations of the present and proposed sources of water supply, and to supplement the information thus obtained by a general survey of these sources and a study of the vital statistics of the city to ascertain any effects attributable to possible pollution of the water supply.

Sanitary Bacteriologist H. M. Campbell was placed in charge of the temporary laboratory, which was equipped from the Ohio River investigation station at Cincinnati, the cost of its maintenance and of the collection of samples of water being borne by the city. The collection and examination of samples continued from January 4 to 17, 1915, during which time 163 samples from 15 different sampling points were collected and examined.

On January 15 Passed Asst. Surg. Frost returned to Knoxville, completing his studies on January 20. As the result of the investigation it was determined that the typhoid death rate in Knoxville has materially declined during the last 10 years (62.5 per 100,000 being the average for the period 1905-1909 and 39.3 for the period 1910-1914), and this disease has not been more prevalent than in other southern cities similar in climate and sewage disposal condi-

tions but having safe water supplies. It seemed reasonable to assume, therefore, that the prevalence of typhoid fever in Knoxville had been caused by other factors than the water supply.

The study of the water-supply source, the plant, and methods of purification, and the results of the bacteriological examinations seemed to justify the conclusion that the present water supply, while not grossly unsafe, was not, under present conditions, of entirely safe and satisfactory quality, since the source of supply, the Tennessee River, is undoubtedly subject to pollution, and the purification plant, under its present unskilled management, can not be depended to purify adequately the water, as the bacteriological examinations showed an almost constant slight pollution and occasionally a considerable degree of pollution.

For the improvement of the water supply of Knoxville Dr. Frost recommended that the management of the purification plant be placed in the hands of a competent sanitary engineer, and a laboratory be established at the filter plant with adequate facilities for frequent chemical and bacteriological examinations of the water; and that after expert engineering advice has been obtained regarding necessary structural changes in the present purification plant, the intake for the water supply be changed to the south side of the Tennessee River above Williams Creek.

A copy of the complete report of Dr. Frost's investigation with his recommendations was furnished to the city authorities.

INVESTIGATION OF POLLUTION OF COASTAL WATERS.

The investigation of the pollution of the Potomac River and its effect upon the sanitary conditions of the oyster beds in the lower portion of that river having been completed in May, 1914, the medical officer in charge of that investigation, Surg. Hugh S. Cumming, was directed to extend the investigation so as to include especially all of the navigable tidal waters of Maryland and Virginia in which shellfish or other sea products are grown for human consumption. The studies were to have for their object the determination of the pollution of tidal waters and its effect upon the public health, and were to include sanitary surveys of watersheds and laboratory examinations of water, mud, and shellfish.

For the purpose of providing transportation and adequate laboratory facilities wherever samples were collected the service steamer *W. D. Bratton* was utilized. The personnel on the vessel has consisted of Surg. Cumming and Sanitary Bacteriologist H. V. Stewart.

The work was begun in June, but had to be discontinued for repair of the steamer and to await the opening of the oyster season. In September the investigation was resumed and continued throughout the winter and spring until the close of the oyster season. A study has been made of every locality of importance from which shellfish are shipped or taken in considerable quantity for local consumption. While no attempt has been made to collect samples from every one of the nearly half million acres of bottom suitable for shellfish growth, surveys have been made and samples taken in sufficient quantity to justify definite conclusions as to the sanitary conditions in the whole area. Naturally the investigation was concentrated

more closely upon those localities most exposed to probable infectious pollution.

No intensive study was made of shucking houses and shipping conditions, as the Bureau of Chemistry, Department of Agriculture, stated that such study was being made by its employees.

Shellfish pollution.—As a result of the investigation it was found that in general the shellfish grown in and shipped from the waters of Maryland and Virginia are free from infectious pollution. Conditions dangerous to the public health not only of these two States but because of the widespread shipments throughout the country, dangerous also to the citizens of other States, were found in a few localities in each of the two States. In addition to notifying the proper local, State, and United States authorities when such danger was found to be present, the medical officer in charge endeavored to have the conditions remedied by advising the State and local authorities as to the remedies, when practicable.

Chincoteague Island.—In Chincoteague, Va., from which 300,000 to 400,000 bushels of shucked oysters alone are annually shipped, in addition to millions of clams, it was found that these shellfish were in many instances being stored before shipment in waters pumped from highly polluted wells in the immediate vicinity of surface privies. The town council was advised to pass ordinances remedying the conditions, which were not only a menace to other localities but the evident source of illness in the community. The State board of health was notified of local conditions, and, in cooperation with the service medical officer and the willing assistance of local authority, the menacing conditions were speedily remedied.

The town council and citizens were also induced to take steps toward securing plans for water and sewage-disposal systems.

Hampton, Va.—In Hampton Creek it was found that oysters were being grown in and shipped from beds bathed in sewage from the outfalls of that city and from other parts of the creek despite a State condemnation made several years before the present investigation. The attention of the State food, shellfish, and health commissioners was directed to the condition, as a result of which these officials took such vigorous action that the evil was remedied. The city of Hampton has been since then sued by planters, and damages have been recovered. After consultation with the service officer in charge, the city secured the services of a sanitary engineer, who has submitted plans for a sewage-disposal system. Acting under the advice of the service medical officer, the National Soldiers' Home and the Hampton Normal and Agricultural Institute for Negroes have modified their sewerage systems and installed chlorine plants for the treatment of sewage.

At West Point, Va., the city council and citizens were addressed, by invitation of the mayor, upon the importance of proper disposal of sewage in tidewater communities.

Chesapeake Bay.—The growing and shipment to interstate points of oysters from grossly polluted areas in Annapolis and Norfolk harbors was discovered and the proper authorities notified. As a result of the investigation, it has been determined that about 2,000 to 2,500 acres of the approximately half million acres of oyster grounds in the two States are so located that they are subject to the danger of infectious pollution from adjacent communities, and that

such grounds should, therefore, be abandoned, or the sewage disposed of by safe means. The location of these dangerous areas has been reported to the local, State, and United States authorities charged with the enforcement of the pure-food laws.

This information is also of great value to the oyster planters themselves, who no longer need be in ignorance as to the sanitary condition of grounds upon which they intend to expend large sums of money.

There are several large areas, particularly those of Hampton Roads and vicinity and those in the Chesapeake Bay near the entrances to Back and Patapsco Rivers, which, because of the economic value of the beds in the regions, the large amount of sewage from near-by cities, and the changing conditions affecting pollution, should be more thoroughly studied, and it is expected that the work will be continued therein.

A detailed report of the investigation of the tidal waters of Maryland and Virginia has been prepared, and will be published as Public Health Bulletin No. 104.

New Jersey.—At the request of the State authorities of New Jersey the investigation has been extended to cover the tidal waters of that State, and during the coming fiscal year the waters of New Jersey, Delaware, Pennsylvania, and New York will be studied, as well as those of the Gulf coast.

EXPERIMENTAL FIELD LABORATORY.

It was found during these investigations that there were many unsolved problems concerning the infectious pollution of shellfish, the solution of which would enable investigators more accurately to determine the sanitary conditions under which this industry is conducted. A laboratory was therefore installed at Fishermans Island Quarantine Station, near the entrance to Chesapeake Bay. Since this station is remote from sources of pollution and surrounded by large shellfish areas which are the property of the Government, it seemed particularly adapted for the purpose. This laboratory work is under the immediate charge of Sanitary Chemist W. F. Wells, who has with him two attendants.

The equipment includes 8 tanks of 500 gallons capacity each, and two power pumps which are used to simulate tidal flow. Valuable studies have already been made and others are being pursued as to the effect of temperature upon pollution, the ingestion and disposition of typhoid bacilli and other organisms, and the best methods for the determination of the number of such organisms in shellfish. This work will be continued.

The investigation of tidal waters with reference to the spread of infectious disease has received the commendation of the various State health organizations as well as of the shellfish growers and dealers, and will result, it is hoped, in great good both to the health of the country and to the shellfish industry.

INDUSTRIAL WASTE STUDIES.

This branch of the investigations of the pollution of navigable waters has been under the general direction of Prof. E. B. Phelps,

chief of the division of chemistry of the Hygienic Laboratory, and the immediate charge of Sanitary Chemist H. B. Hommon.

The laboratory headquarters of the field investigations of industrial wastes have been transferred to Cincinnati, Ohio. The bringing to a close of the chemical studies previously carried on there in connection with the Ohio River investigation proper has made the chemical laboratory at this station available for industrial wastes studies, and the survey of industrial wastes made in connection with the sanitary survey of Ohio River cities in 1914 affords a basis upon which to build a more intensive survey and analytical study. Further advantages of this arrangement are the number and variety of waste-producing industries in the vicinity of Cincinnati, and the facility of coordinating the results of a study of these wastes with the results of the stream pollution studies conducted at this station. The investigations of industrial wastes, while conducted independently of the studies of the pollution of the Ohio River, constitute an essential supplement to them, giving necessary data as to the character of polluting wastes entering the Ohio River, the amounts of these wastes having been previously estimated.

To carry on these studies Sanitary Engineer H. R. Crohurst and Sanitary Bacteriologists W. v. D. Tiedeman and E. J. Thierault were assigned to Cincinnati during June, 1915; and arrangements were made for the assignment, about July 1, of Sanitary Chemist H. B. Hommon to have direct supervision of the studies.

Tannery wastes.—The first experimental plant for the studies of tannery wastes was placed in operation at Luray, Va., on August 20, 1914, and since that date the studies have been carried on continuously. Tannery wastes comprise three distinct types of water. The waste waters from the liming and dehairing processes are strongly alkaline and contain considerable hair which has escaped the screens. The waters from the beaming process contain much flesh and organic matter and are highly putrescible. The waters from the tanning process proper contain the spent tan liquor with much tan bark in suspension, and are dark colored and acid. The investigations were first directed toward the separate treatment of these three waters in order that basic information of general value might be obtained applicable to other plants discharging only one or the other of these types of waste or discharging in their combined effluents mixtures of these three waters in different proportion to those found at Luray. The possibility of purification treatment having been developed on the three waters separately, advantage was taken of the chemical reaction produced upon mixing them and during the latter part of the year the combined effluent has been treated as a whole. The possibilities of such combined treatment have been fully developed and work is now in progress upon the advantages of additional chemical treatment and of certain special mechanical devices. The results of the work when completed will therefore be applicable not only to the particular tannery in which they are made, but to the general problem of disposal of tannery waste waters. Cooperation has been entered into with the engineering division of the Michigan State Board of Health, where work upon this problem is being done, such cooperation taking the form of an interchange of data and experiences.

Strawboard wastes.—Early in the year plans were completed as far as practicable for an experimental plant for the disposal of the waste waters resulting from the manufacture of strawboard. With assistance of officers of the Indiana State Board of Health a suitable location for this study was found at Noblesville, Ind. In addition to the general interest which this problem presents this location furnished additional special interest because of the possibility of the pollution of the city water supply of Indianapolis by the waste waters. The company had been put to great expense to prevent such pollution by the construction of large impounding reservoirs and was therefore anxious to determine proper remedies to relieve the situation. The plant was put in operation early in January, but extreme cold weather prevented active work for a month. Since that time the studies have gone on continuously. The studies taken related to preliminary sedimentation, addition of chemicals and secondary sedimentation, and rapid filtration through a mechanical filter. Special attention has been given to the question of utilization of the recovered materials. Studies upon the use of this material mixed with straw fiber to make a low-grade strawboard and extensive studies upon its fertilizer value have been conducted. The former has met with some measure of success. Complete results of the agricultural experiments will require some time.

Cannery wastes.—At the suggestion of various health officers and others throughout the country, reenforced by an appeal from the headquarters of the National Canners' Association, preparations were made during September for preliminary studies of the wastes produced in this industry and the possibilities of their disposal. Small-scale experiments were undertaken at a large cannery at Farnham, N. Y., in the fall and served as the basis for the design of a large-scale purification plant, plans of which were later prepared.

The interest of the company in this project was sufficient to induce them to offer to construct this plant under the supervision of an officer of the service. The plans having been submitted to the State Board of Health of New York for approval in March, and approved by that board, work was begun on construction in April. After this work was well underway the canning plant was destroyed by fire, and the company decided not to rebuild at that point. This work was therefore discontinued.

Creamery wastes.—At the request of the Dairy Division, Bureau of Animal Industry, United States Department of Agriculture, plans have been prepared for a plant for the disposal of creamery wastes, to be located at the experimental creamery of the Dairy Division at Grove City, Pa. These plans have been submitted to the Dairy Division, which has undertaken to construct the plant under the direction of an officer of this service, after which its operation will be supervised by that officer.

Grape juice wastes.—A conference was recently had with the representative of a large producer of grape juice with reference to a serious condition of stream pollution arising from the discharge of the waste waters of that industry. Advice has been given as to the proper mode of procedure, and it is anticipated that assistance will be requested from this service in the general layout and operation of a full-scale remedial works.

SEWAGE DISPOSAL STUDIES.

As in the preceding years, investigations of sewage disposal have been under the general supervision of Prof. E. B. Phelps and the immediate direction of Sanitary Engineer L. C. Frank.

Experimental plants.—The sewage experimental plant at the Hygienic Laboratory has been in continuous operation during the year, and has been modified from time to time as developments have necessitated. Numerous difficulties conditioned by the special type of sewage being treated, which is representative of fresh sewage from a single house or small group of houses, have arisen and have required special studies and new types of apparatus. Special attention has been given to the best form of treatment and to the treatment of the sewage thus prepared upon a sand filter. In those sections of the country where sand of suitable quality is available this type of purification will be found most satisfactory for small-scale domestic plants, and the data now available, reinforced by that from the Chevy Chase plant upon this phase of the problem, is being prepared for publication. There remains to be determined the most suitable type of purification in localities where sand is not available.

The experimental plant at Chevy Chase was placed in operation on July 2, 1914, treating the collected sewage from about 12 houses. It comprises an Imhoff tank and sand filter with suitable automatic dosing apparatus. It has given consistently satisfactory results throughout. One chief value of this installation in addition to the experimental data which it has furnished is an object lesson to communities similarly situated. Recent tendencies in sewage disposal are opposed to the older practice of long trunk sewers and the concentration of sewage at single outlets. The present policy of the District and Maryland State authorities is along these lines. Disregarding the question of necessity of ultimate purification of the sewage of the District of Columbia this probably represents the most satisfactory solution. If, however, it be assumed that the time will come when purification will be called for, then local purification with all the saving in trunk sewer construction which it makes possible represents beyond doubt the greatest economic efficiency. With improvements in the art of sewage purification such local purification will undoubtedly be made possible with less and less danger of offense, and will, it is confidently believed, ultimately be possible in the heart of residential districts.

At the request of the Dairy Division, Bureau of Animal Industry, United States Department of Agriculture, plans have been completed and submitted for a small sewage disposal plant to be located on the dairy farm of the division at Beltsville, Md. These plans were completed and submitted on December 4, and work upon the actual construction has been in progress, although somewhat delayed by reason of lack of funds.

Sanitary privy.—The ever-increasing importance of a sanitary privy which will properly prevent pollution of well water and dispose of its contents in the least objectionable manner has led to the design of a privy upon somewhat novel lines and to its installation as an experiment on the grounds of the Hygienic Laboratory. The distinguishing feature of this design is its adaptation of the principle

of the modern biolytic tank to privy conditions. This privy has been in continuous use by an average of about six persons since March of the present year. It is under close observation, accurate records being kept of its use and accumulation of material, both liquid and solid. It gives every evidence of a satisfactory compliance with the essentials of the sanitary privy above alluded to.

The pit privy.—In connection with the campaign for the improvement in methods of excreta disposal some persons have recommended the installation of privies of the "pit" type, with or without privy houses, those without houses being called "umbrella privies." The recommendation has been based partly on the view that this type of privy will suffice to reduce hookworm disease and that its use reduces the labor involved in finally disposing of the excreta.

The studies of Prof. C. W. Stiles, of the Hygienic Laboratory, indicate that, while pit privies may be fairly satisfactory from a purely zoological point of view, they can not be recommended, and in certain regions, especially in swampy lands and in limestone regions, they may be dangerous. Prof. Stiles therefore warns against accepting the pit privies as safe on the basis of zoological arguments, for they do not meet the broader biological requirements. He also disagrees with the popular idea that flies do not breed and feed in pit privies, and for this reason opposes their construction.

Sewage aeration.—During the past year much interest has been aroused by some English discoveries relating to the artificial aeration of sewage. This is a matter which has been dealt with on various occasions during the past 25 years, most recently and most successfully up to the present discoveries by the present chief of the division of chemistry, Hygienic Laboratory, in conjunction with Col. William M. Black, United States Army Engineer Corps, at Brooklyn, N. Y. The English work has indicated what seems to have been the essential missing element, namely, a proper cultivation of the oxidizing organisms. This work appears to be epoch making. In view of its importance and the cordial relations existing between the Hygienic Laboratory and the Baltimore Sewerage Commission, the chief engineer of that commission was approached with a proposition that the matter be investigated by the United States Public Health Service and the Baltimore Sewerage Commission in cooperation, utilizing the plant and equipment at Baltimore and the services of a designated officer of this service. This matter was promptly arranged and work upon plans for the modification of existing tanks at Baltimore was immediately begun. The work of construction was undertaken shortly afterwards and is now practically complete.

Steam disinfection of excreta.—During the year an experimental model was constructed of a steam disinfector to be used on vessels and trains. Experimental operation of this apparatus at the Hygienic Laboratory indicated thoroughly satisfactory results from a bacteriological point of view. These experiments also permitted some estimate of cost of treatment, and the indications were that the cost would be merely nominal. In view of these results a more detailed study of the mechanical appliances necessary for the satisfactory and automatic operation of such a steam disinfector has been made and a careful design worked out. Through cooperation with

the United States Coast Guard Service arrangements were made for the installation of a plant on board one of the Coast Guard cutters. In view of the particular nature of the work bids received upon proposals were prohibitively high and the plan of installing the equipment on board a cutter was abandoned. Modified plans were prepared for a stationary apparatus which will permit a complete test of the mechanical, thermal, and bacteriological efficiency, and arrangements have been completed for the installation of such an apparatus at the sewage pumping station of the District of Columbia, where steam for its operation will be available at all times. After a satisfactory demonstration of the mechanical features of this apparatus arrangements will be made for installing it on one or more vessels.

PROJECTED SEWERAGE AT BOWLING GREEN, KY.

In accordance with recommendations made by Passed Asst. Surg. W. H. Frost¹ the common council and board of public works of the city of Bowling Green, Ky., took steps for the installation of a sanitary sewerage system in the city. When the plans for the work were under consideration by the city government a request was received from the secretary of the State Board of Health of Kentucky for the detail of an officer to advise the local authorities in this matter.

Sanitary Engineer J. K. Hoskins was detailed for this duty and spent two days (Apr. 29-30, 1915) at Bowling Green conferring with the city authorities. After reviewing critically the plans submitted for the proposed sewerage system and studying local conditions, a number of suggestions were made by him for certain changes in the preparation of the contract and specifications and their approval by the legal representative of the city, and modifications of the plans to include the entire area of the town, increase the size of the main trunk sewers, provide manholes at lateral ends and changes of grade, and other minor changes.

PROPOSED SEWERAGE AT ST. SIMONS ISLAND, GA.

In response to requests from the health officer of Brunswick, Ga., and the secretary of the State Board of Health of Georgia, Sanitary Engineer H. R. Crohurst was detailed on March 12, 1915, to advise the local authorities in regard to the adoption of proper methods of sewage disposal at St. Simons Island, Ga.

At the time of Mr. Crohurst's investigation, open privies of an insanitary character were used almost entirely in certain groups of summer cottages, and it was the desire of the authorities to introduce a better system of sewage disposal in this part of the island. After a careful consideration of local conditions, it was suggested by Mr. Crohurst that two lines of sewers should be constructed in that section, with outlets into the ditches then used for the drainage of marshes; that the drainage ditches should be cleaned and lowered to provide a free flow for the sewage; and that the sewage before discharge into the ditches be treated with hypochlorite of lime in a settling and disinfection tank. It was also recommended that provision should be made for flushing the ditches by connecting with the

¹ See p. 63.

ocean and constructing tide gates, and that, if necessary, the ditches should be covered to avoid the creation of a nuisance.

SEWAGE DISPOSAL AT NATIONAL SOLDIERS' HOME, VA.

In accordance with a request received from the governor, National Soldiers' Home, Hampton, Va., Sanitary Chemist H. B. Hommon was directed on March 10, 1915, to inspect the chlorine plant for the sterilization of sewage at the home and make recommendations as to the advisability of having this method adopted in similar institutions discharging sewage in the vicinity of oyster beds.

As a result of the investigation, some suggestions were made to the engineer in charge in regard to changes in construction and operation which would increase the usefulness of the plant. While it was recognized that the ideal way for the disposal of sewage in such institutions is to have it treated with that of neighboring communities, yet, until local conditions permit this to be done, there might be some advantages in having the method used at the National Soldiers' Home, Va., adopted provisionally by like institutions similarly situated.

SIXTH INTERNATIONAL SANITARY CONFERENCE OF THE AMERICAN REPUBLICS.

As stated in the last annual report, an announcement and provisional program of the Sixth International Sanitary Conference of the American Republics, to be held in Montevideo, Uruguay, December 13 to 21, 1914, were issued by the Surgeon General in his capacity as provisional chairman of the international sanitary bureau.

Provision was subsequently made by Congress authorizing the President to have the United States represented at the conference by officers of the Public Health Service. In view, however, of the international situation, it was decided by the Government of Uruguay to postpone the conference to a date to be designated at a future time.

THIRTEENTH ANNUAL CONFERENCE OF STATE AND TERRITORIAL HEALTH AUTHORITIES.

In compliance with provisions of law, the thirteenth annual conference of State and Territorial health authorities with the service was held in Washington, D. C., May 13, 1915, 23 States, 1 Territory, and the District of Columbia being represented.

The following subjects were discussed: Interstate quarantine regulations; Reporting of diseases; Sanitation of public conveyances; Rural sanitation; Pollution of navigable waters; Malaria; Pellagra; Sickness insurance; and Control of leprosy.

The resolutions adopted by the conference expressed approval of the interstate quarantine regulations proposed by the service, advocated improved methods of sewage disposal in rural communities, and suggested assumption of the control of leprosy by the Federal Government.

The transactions of the conference have been issued as Public Health Bulletin No. 72.

REPRESENTATION AT MEETINGS OF SCIENTIFIC AND SANITARY ASSOCIATIONS AND CONGRESSES.

During the year the service was represented at the following meetings:

- Second Biennial Conference of Health Officers of the State of Wisconsin, Madison, Wis., July 16-17, 1914.
- George Peabody College for Teachers, Nashville, Tenn., July 16-18, 1914.
- Sixth District Medical Association of North Carolina, Wrightsville Beach, N. C., August 4, 1914.
- Conference of Health Officers, Pineville, Ky., August 18-20, 1914.
- American Pharmaceutical Association, Detroit, Mich., August 24-29, 1914.
- Central States Water Works Association, Wheeling, W. Va., August 25-27, 1914.
- Southwestern Medical Society, Corning, Iowa, September 10, 1914.
- Polk County Medical Society, Des Moines, Iowa, September 11, 1914.
- Conference of Health Officers of New York State, Saratoga Springs, N. Y., September 15-17, 1914.
- Pennsylvania State Homeopathic Medical Society, Wernersville, Pa., September 24-26, 1914.
- International Joint Commission, September 25-30, 1914.
- Association of Military Surgeons, Cincinnati, Ohio, September 29, 1914.
- Kanawha Medical Society, Charleston, W. Va., October 6, 1914.
- Mississippi Valley Conference on Tuberculosis, St. Louis, Mo., October 6-8, 1914.
- Vermont State Medical Society, Rutland, Vt., October 8-9, 1914.
- National Council for Industrial Safety, Chicago, Ill., October 12-15, 1914.
- Sixth Annual Conference of State, County, and Municipal Health Officers, Del Monte, Cal., October 12-16, 1914.
- First North Atlantic Conference on Tuberculosis, Philadelphia, Pa., October 16, 1914.
- Tenth Maryland Conference of Charities and Corrections, Easton, Md., October 20, 1914.
- Mississippi Public Health Association, Jackson, Miss., October 27-28, 1914.
- Mississippi Valley Medical Association, Cincinnati, Ohio, October 27-29, 1914.
- Medical Society of Virginia, Washington, D. C., October 27-30, 1914.
- National Funeral Directors' Association, New Orleans, La., October 27-30, 1914.
- Ohio Valley Medical Association, Evansville, Ind., November 4-5, 1914.
- Southern Medical Association, Richmond, Va., November 9-12, 1914.
- American Association for the Study and Prevention of Infant Mortality, Boston, Mass., November 12-14, 1914.
- American Public Health Association, Jacksonville, Fla., November 30-December 4, 1914.
- Conference on Infantile Mortality, Chicago, Ill., December 10, 1914.
- Women's National Waterways and Harbor Commission, Washington, D. C., December 10, 1914.
- Southwest Medical and Surgical Association, El Paso, Tex., December 10-12, 1914.
- American Federation of Biological Societies, St. Louis, Mo., December 28-30, 1914.
- American Association for the Advancement of Science, Philadelphia, Pa., December 28-January 2, 1915.
- Society of American Bacteriologists, Philadelphia, Pa., January 1, 1915.
- League of Washington Municipalities, Olympia, Wash., January 25-27, 1915.
- Council on Pharmacy and Chemistry, American Medical Association, Chicago, Ill., February 12-13, 1915.
- New Jersey State Boards of Health, Trenton, N. J., February 19-20, 1915.
- Indiana Sanitary and Water Supply Association, Indianapolis, Ind., February 23-24, 1915.
- American Life Convention, French Lick Springs, Ind., March 3-5, 1915.
- Central Committee on National Health Organizations, New York City, March 13, 1915.
- Lake Michigan Water Commission, Milwaukee, Wis., March 19, 1915.
- American Chemical Society, New Orleans, La., March 31-April 3, 1915.

- American Society of Pathologists and Bacteriologists, St. Louis, Mo., April 1-3, 1915.
 South Texas Medical Society, Victoria, Tex., April 8-9, 1915.
 Tennessee State Medical Association, Nashville, Tenn., April 13-15, 1915.
 Georgia Association of State, Municipal, and County Boards of Health, Macon, Ga., April 20, 1915.
 Alabama Medical Association, Birmingham, Ala., April 20-21, 1915.
 Southern Commercial Congress, Muskogee, Okla., April 26-30, 1915.
 Conference for Health Officers, Rosedale, Kans., April 26-May 1, 1915.
 First District Medical Society of Arkansas, Jonesboro, Ark., April 27, 1915.
 Medical Society of State of New York, Buffalo, N. Y., April 27, 1915.
 State Medical Association of Texas, Fort Worth, Tex., May 4, 1915.
 Southern Sociological Congress, Houston, Tex., May 8-11, 1915.
 American Association of Immunologists, Washington, D. C., May 10, 1915.
 National Association for the Study of Epilepsy, Fort Monroe, Va., May 10, 1915.
 American Water Works Association, Cincinnati, Ohio, May 10-14, 1915.
 American Association for Promoting Hygiene and Public Baths, New York City, May 11, 1915.
 Virginia Public Health Association, Lexington, Va., May 11-12, 1915.
 American Medico-Psychological Association, Fort Monroe, Va., May 11-14, 1915.
 National Conference of Charities and Corrections, Baltimore, Md., May 12-19, 1915.
 State and Provincial Health Authorities of North America, Washington, D. C., May 14, 1915.
 Southwestern Sanitary Association, Asheville, N. C., May 25-26, 1915.
 Michigan and Ohio Funeral Directors and Embalmers' Association, Toledo, Ohio, June 9-11, 1915.
 National Association for the Study and Prevention of Tuberculosis, Seattle, Wash., June 14-16, 1915.
 Oyster Growers and Dealers' Association, Washington, D. C., June 15-16, 1915.
 American Society of Tropical Medicine, San Francisco, Cal., June 14-17, 1915.
 Medical Society of the State of North Carolina, Greensboro, N. C., June 15-17, 1915.
 Summer School for Health Officers, University of Texas, Austin, Tex., June 16-17, 1915.
 American Association of Medical Milk Commissions, San Francisco, Cal., June 17-19, 1915.
 Pan-American Medical Congress, San Francisco, Cal., June 17-21, 1915.
 American Medical Association, San Francisco, Cal., June 21-25, 1915.
 Pennsylvania Pharmaceutical Association, Forest Park, Pa., June 22-24, 1915.
 American Hospital Association, San Francisco, Cal., June 22-25, 1915.
 American School Hygiene Association, San Francisco, Cal., June 25-26, 1915.
 American Academy of Medicine, San Francisco, Cal., June 25-28, 1915.

In addition, the service was represented regularly by Surg. J. M. Eager on the permanent committee of the International Office of Public Hygiene at Paris.

EDUCATIONAL LECTURES.

Mention has been made under different headings of the educational lectures delivered by officers of the service in the course of investigations of rural sanitation, malaria, pellagra, trachoma, school hygiene, mine sanitation, etc.

In addition a number of popular addresses were presented, in many cases without expense to the service, before miscellaneous audiences, as follows:

- Teachers' Institute, Whiteville, N. C., August 10, 1914.
 Teachers' Institute, Burgaw, N. C., August 24, 1914.
 Business Men's Association, Philadelphia, Pa., September 28, 1914.
 Louisville Eye, Ear, Nose, and Throat Society, Louisville, Ky., November 12, 1914.

- Biological Society, University of Pittsburgh, Pa., December, 1914.
 Knife and Fork Club, Kansas City, Mo., January 15, 1915.
 Johns Hopkins Hospital Medical Society, Baltimore, Md., January 18, 1915.
 Medical College of Virginia, Richmond, Va., February 9-10, 1915.
 Public Welfare Association, Springfield, Mo., February 8-11, 1915.
 Young Men's Business Club, Springfield, Mo., February 11, 1915.
 "Health Week," Baltimore, Md., February 12-13, 1915.
 Eastern Academy of Medicine, New York City, February 28, 1915.
 Medical Department, University of Louisville, Louisville, Ky., March 19, 1915.
 Academy of Science and Arts, Pittsburgh, Pa., March, 1915.
 Pathological Society, University of Minnesota, St. Paul, Minn., March 30, 1915.
 Harvard Medical School, Boston, Mass., April 2, 1915.
 Indiana University School of Medicine, Indianapolis, Ind., April 10, 1915.
 "Good Health Week," Lapeer, Mich., April 21, 1915.
 University of South Carolina, Columbia, S. C., April 26, 1915.
 Post Graduate Medical School, New York City, April-June, 1915.
 "Health Campaign," Port Huron, Mich., May 17, 1915.
 "Health Campaign," Bangor, Lewiston, and Portland, Me., May 17-19, 1915.
 Summer School of the South, University of Tennessee, Knoxville, Tenn., June 22-July 9, 1915.

Among the subjects dealt with in these meetings have been infectious diseases, pellagra, health administration, industrial hygiene, sewage disposal, plague, tuberculosis, personal hygiene, typhoid fever, malaria, etc.

DISSEMINATION OF INFORMATION.

In order that the results of investigations shall accomplish their purpose, it is necessary to disseminate them through proper channels. Among the means taken to this end are (1) personal interviews with health authorities following particular studies within their jurisdictions, (2) publications, (3) lectures, (4) press service, (5) correspondence, (6) exhibits.

Interviews and conferences.—Inasmuch as many investigations are undertaken on the request of State and local authorities to meet an emergency, the results of investigations are frequently made known verbally as soon as obtained and advice given based on these data so that remedial action may be immediately taken. Advantage is frequently taken also of situations to advise not only the health authorities but the mayors and councils of cities, and, at times, the executives and legislative bodies of States.

Publications.—Monographs on sanitary subjects are regularly issued in the weekly Public Health Reports and in special publications, such as Public Health bulletins and Hygienic Laboratory bulletins. (See report on publications, p. 342.)

Lectures.—Since it is necessary for the service and its officers to keep in touch with the scientific work of others, and to make known results of work accomplished, an essential function, as previously stated, is the attendance at meetings of scientific and sanitary associations. Those in attendance at these meetings represent many sections of the country. There is accordingly presented opportunity to disseminate information first-hand, which will in turn be utilized by others and made available through them to the public at large. Attendance at these meetings is decided upon, therefore, after taking into account the National or State character of the meeting and the

objects it has to accomplish. Opportunity is also taken of the presence of officers in the field to give popular addresses. By this means not only is information of local interest conveyed but the activities of the Public Health Service are brought directly to the attention of the public generally. Reference has been made in previous pages to the giving of public addresses in connection with field studies, and on page 118 appears a list of associations which were also thus popularly addressed.

Press service.—Through the Division of Domestic Quarantine brief abstracts of all publications issued have been furnished regularly to the newspapers of the country and used extensively by them. Some of the results of investigations have also been made public by that division by means of exhibits and stereopticon slides.

MARITIME QUARANTINE.

During the fiscal year ended June 30, 1915, there were inspected for the protection of the ports of the United States, its possessions and dependencies, from quarantinable diseases 10,397 vessels at the quarantine stations in the mainland of the United States, 2,224 vessels at the insular quarantine stations (Hawaii, Porto Rico, and the Philippines), and 2,760 vessels at the foreign inspection stations, making a total of 15,381 vessels inspected by medical officers of the United States Public Health Service. These vessels carried 1,208,827 passengers and crews.

There were fumigated at the mainland, insular, and foreign quarantine stations 3,498 vessels, the process having been performed either for the eradication of infection or the destruction of rats or mosquitoes.

During the previous year (ending June 30, 1914) 14,370 vessels were inspected at the mainland, insular, and foreign quarantine stations, showing that 1,011 more vessels were inspected during the year just closed than during the one preceding.

During the fiscal year 1914, 2,750 vessels were fumigated at the mainland, insular, and foreign quarantine stations, which shows that for the year just ended there was an increase of 748 vessels fumigated.

The work of improving the quarantine stations of the service has progressed as usual, both in connection with increased facilities and equipment, and the general betterment of the stations as a whole. The floating quarantine plant at Providence has been completely equipped and is modern and up to date in every respect. This vessel at the present time will accommodate 800 persons, and is equipped with a modern steam heating plant and sanitary system, and is also equipped with modern steam and formaldehyde disinfecting chambers. This floating plant is capable of being moved on short notice to any other location in Providence Harbor which may be found more convenient for any special quarantine emergency arising.

INSPECTION OF NATIONAL QUARANTINE STATIONS.

A joint inspection of each quarantine station of the service was made during the year by a representative of the service, a representative of the Supervising Architect's Office, and a representative of the United States Navy, the latter loaned for the purpose in order to contribute his technical advice. The object of the inspection was to determine the exact condition of every quarantine station, with a view to their future development and improvement, and with a view to bringing them up to the proper standard of repair.

TRANSFER OF THE QUARANTINE AT BOSTON, MASS.

On June 1, as the result of a resolution passed by the city council of Boston, Mass., the mayor of that city was authorized to transfer the quarantine function from local to Federal control. This marks

an important step not only in the development of the national quarantine service, operated by the Public Health Service, under the Treasury Department, but it is important as showing that the public in general have awakened to the necessity for, and economy resulting from, the uniform control of quarantine in the United States by the National Government.

OPENING OF THE QUARANTINE STATION AT GALVESTON, TEX.

On July 19, 1915, the quarantine station at Galveston, Tex., was formally opened for the boarding and treatment of vessels arriving from foreign ports. This station, the building of which was begun about two years ago, has just been completed. It is located on Pelican Spit, and is surrounded by a newly constructed bulkhead, which has enabled the dredging of the channel in front of the station to such a depth that deep-draft vessels can be placed at the station wharf. The reservation includes about 25½ acres. The buildings comprise an executive building, quarters for the medical officer in charge, quarters for the assistant surgeon, quarters for attendants, disinfecting building, storehouse, detention barracks, carpenter shop, boathouse, hospital, and paint shop. Two large and powerful boarding launches have been purchased for the station and will be transferred there in the near future. The site was transferred from the War Department in 1910.

RAT ERADICATION ON VESSELS.

This important work has been carried out during the year along the usual lines, with the exception of the fact that the use of funnel gas and hydrocyanic-acid gas has become more popular with the officers of the service engaged in this work. In connection with rat destruction the fumigating steamer *Neptune*, at Philadelphia, which is equipped with apparatus for the use of funnel gas, was transferred to New Orleans, where the success attending the use of this vessel, both as to efficiency in rat destruction and the saving of time for vessels, caused a general request to be made for the detail of an additional fumigating steamer of the same type to handle the increased traffic at New Orleans due to conditions in Europe. On this account a vessel of the tugboat type was purchased in New York and is now being equipped with funnel-gas apparatus, after which it will be transferred to New Orleans to fill the requirement.

MEDICAL OFFICERS DETAILED AT MEXICAN PORTS.

On April 1, in accordance with the usual custom, medical officers of the service were assigned to duty in the American consulates at the following Mexican ports: Tampico, Tuxpam, Vera Cruz, Frontera, and Progreso. The tour of duty in these ports begins April 1 and ends November 1, the "close quarantine" season for the purposes of protection from yellow-fever infection.

INSPECTION OF MEXICAN PORTS.

In order to facilitate commerce between the Mexican ports and the southern ports of the United States, notwithstanding the conditions

in the Mexican Republic, it was necessary to send an experienced officer, one expert in yellow-fever work, to visit these ports in order to determine the exact sanitary conditions, with a view of arranging quarantine restrictions from period to period, subject to subsequent inspections. The officer detailed for this work was Surg. G. M. Corput, who visited Progreso first on April 8, reporting that at that time shipping from that port offered no menace from yellow fever, except by passenger travel or by members of crews going ashore and becoming infected. This is on account of the fact that the majority of vessels loading at Progreso, on account of the shoal water, are compelled to load out a distance of from 3 to 5 miles from shore, practically all of the loading being done by daylight. A few vessels load at the long wharf at Progreso, known as the Porfirio Diaz, which wharf extends 1,680 feet from the shore line, and, on account of shoal water, vessels can load only at the extreme sea end of the wharf. From the land end of the wharf to the nearest building is approximately 1,000 feet, and the fact that the winds from the north are practically constant, being of great velocity in the evenings and at night, and even of moderate intensity in the morning, assures no possibility of mosquitoes getting aboard vessels from shore. The cargo from this port is sisal, which is loaded on tramcars in the warehouses and hauled out to the wharf to be loaded on ships. The sisal is so closely packed that it is considered impossible for mosquitos to be harbored in the bales, and the cars are so open and wind swept that it is thought equally impossible for mosquitoes to be carried out clinging to the bales. At the time this report was made the season was dry, and there were no mosquito-breeding places found, notwithstanding the fact that a careful search was made. There were many soldiers in Progreso, most of them from the interior of Mexico, living crowded together and under most unhygienic conditions, but no yellow fever was discovered.

The inspector proceeded from Progreso to Merida, where he was informed that there was much yellow fever, both in the city proper and in the surrounding country. An inspection of the lazaretto at Merida, where some 30 patients were confined as suspects, failed to disclose any cases of yellow fever, although in other houses two mild types of the disease were discovered in children.

The inspector, as a result of a careful study of records and consultations with numerous responsible persons, was convinced that only two cases of yellow fever had occurred in Merida, one on January 25 and the other on March 17, both terminating fatally. The inspector was of the opinion that the authorities of the State of Yucatan had undoubtedly made many efforts to eliminate yellow fever from that part of the country. All physicians are required to report cases of illness in which there is a temperature of $38\frac{1}{2}^{\circ}$ C. or over. These cases are immediately removed to the lazaretto and treated as suspects until diagnosis is made. When the cases are found not to be yellow fever they are removed from the hospital to their homes at once. The result of this practice is that a good many persons who are sick are not seen by physicians, and as yellow fever is usually mild in children, it is thought that many of the cases recover without medical attention. It is also believed that the endemicity of yellow fever in Yucatan is due to that fact. It is also thought that a number of

cases of yellow fever are not recognized, as diagnosis is based almost entirely upon the presence of black vomit, cases in which black vomit does not occur being diagnosed as "paludisma" or "calentura."

The general condition of Merida as to cleanliness of streets, sidewalks, etc., was remarkably good, but the sewer system was pronounced incomplete, and the sewage disposal depends upon the general seepage. On this account the absence of enteric fever is striking, although diseases due to intestinal parasites are prevalent, as is pellagra. Many cases of leprosy, some in the advanced stages, were noticed.

After leaving Merida, the inspector next proceeded to Campeche, where sanitary conditions were found to be vastly inferior to those at Merida, the city generally being very dirty. The sanitary authorities in Campeche denied positively the existence of yellow fever, but in view of the fact that the two cases which had occurred in Merida came from Campeche, it was thought that their knowledge of the exact conditions in the latter place was not perfect. Furthermore, the inspector was in a number of private homes in Campeche and observed some cases of yellow fever among children.

The town of Uman, with a population of about 2,000, and distant about 12 miles from Merida, was visited, and a case was seen which, while thought to be yellow fever, was so far advanced toward recovery as to make a positive diagnosis impossible.

The next port visited was Frontera. This town is located on the Grijalva River, about 3 miles inland, the entrance to the river being, however, so shallow that only very small vessels can get to Frontera itself. The larger vessels, therefore, must anchor outside the bar, about $1\frac{1}{2}$ miles from the nearest point of land. Conditions are such at this anchorage as to make it almost impossible for mosquitoes of any kind to get from the land to ships, and it is thought that the only possible danger of bringing yellow fever from Frontera to the United States would be by means of passengers, or by members of the crews of vessels going ashore and becoming infected.

The inspector's recommendation regarding this port was based on the above-mentioned facts.

The sanitary supervision by the Mexican authorities, as well as the hospital facilities in Frontera, were considered of practically no consequence. While the inspector did not see any cases of yellow fever at Frontera, he was convinced that the disease is endemic in that port through the infection of nonimmune children.

The next place visited was San Juan Bautista, a city of approximately 20,000 people, located on the Grijalva River, 75 miles inland from Frontera. The sanitary conditions in this city were bad, being conducive to widespread outbreaks of almost any contagious or infectious disease which might be introduced. The inspector saw no cases of yellow fever in the city, but was convinced that this was due to the fact that the disease was being concealed, or that persons were generally ignorant as to the presence of the disease, or else ignored it altogether, especially amongst children. Pellagra, malaria, hookworm, and other diseases due to intestinal parasites are present in this place.

Vera Cruz was next visited, where the conditions as regards rain were very much the same as reported at Progreso, and on this account

there were very few mosquitoes. A careful investigation convinced the inspector that there had been no yellow fever at Vera Cruz prior to his arrival and that none existed during his stay there. The normal population of Vera Cruz is between 35,000 and 40,000, but at the time of the inspector's visit there were in the city upward of 80,000 people, most of them living under extremely unfavorable conditions, camping under awnings, in the streets, and absolutely unprotected from mosquitoes. The large influx of people into Vera Cruz was from the interior, especially from Mexico City and its vicinity, and as all of that territory is outside of the yellow fever belt, it is safe to assume that there are at the present time 50,000 nonimmunes in Vera Cruz. There is a considerable amount of communication between Vera Cruz and the other Mexican ports along the coast to the eastward. This applies especially to Progreso, Lagoon, Frontera, and Puerto Mexico. The introduction of yellow fever from any one of these ports into Vera Cruz is not only possible but extremely probable.

The water supply of Vera Cruz is reported to be bad, and entirely inadequate for the needs of its present large population.

Tampico was next visited. At this place sanitary conditions are practically the same as in Vera Cruz, except that Tampico has many natural advantages over Vera Cruz from a sanitary standpoint. No yellow fever was found there, nor was there any evidence that it had occurred there since 1910. Tampico has double her normal population, most of them nonimmunes, as is the case at Vera Cruz.

PLAGUE IN CUBA.

Bubonic plague reappeared in Habana during the month of February, 1915, which occasioned the dispatch of an additional officer to this port to assist the medical officer of the service regularly stationed there, and occasionally the employment of additional inspectors. The details of the outbreak of plague in Habana and its appearance in other places in Cuba will be found under the heading of Habana, Cuba.

Table giving transactions at national quarantine stations for the fiscal year ended June 30, 1915.

Stations.	Steamers inspected.	Sailing vessels inspected.	Total vessels inspected.	Vessels spoken and passed.	Vessels quarantined.	Vessels fumigated.	Total passengers and crews inspected.
Alexandria.....			1				
Beaufort, S. C.....							
Biscayne Bay.....	38	88	126	226		25	8,053
Bocagrande, Fla.....			106	86	1	7	671
Boston, Mass. (City.....			727			69	67,812
(service.....			77			12	3,714
Brownsville, Tex.....							
Brunswick, Ga.....	16	10	26	18		9	1,383
Cape Charles.....	1,060	27	1,087	38	14	126	79,584
Cape Fear.....			62	1		24	1,670
Charleston, S. C.....	137	8	145	3		15	4,088
Columbia River, Oreg.....	54	87	141			24	4,475
Coos Bay Quarantine.....		1	1			1	12
Cumberland Sound.....	20	28	48	1		6	951
Darien, Ga.....							
Delaware Breakwater.....	48	7	55	1			1,511
Eagle Pass.....							

Table giving transactions at national quarantine stations for the fiscal year ended June 30, 1915—Continued.

Stations.	Steamers inspected.	Sailing vessels inspected.	Total vessels inspected.	Vessels spoken and passed.	Vessels quarantined.	Vessels fumigated.	Total passengers and crews inspected.
Eastport, Me.....	380	49	929	.....	.....	.....	60,265
El Paso, Tex.....	.....	.....	.....	.....	.....	.....	¹ 1,370
Eureka, Cal.....	10	7	17	.....	.....	1	.....
Everett, Wash.....	3	1	4	.....	.....	.....	143
Georgetown, S. C.....	.....	.....	.....	.....	.....	.....	.....
Gulf Quarantine.....	.....	.....	101	8	.....	60	1,526
Hoquiam, Wash.....	.....	69	69	.....	.....	.....	628
Key West, Fla.....	554	62	616	.....	1	39	49,811
Ketchikan, Alaska.....	.....	.....	131	.....	.....	.....	5,970
Laredo, Tex.....	.....	.....	.....	.....	.....	.....	² 2,550
Mobile, Ala.....	431	177	608	.....	23	169	.....
Morgan City, La.....	.....	.....	19	.....	.....	3	164
New Orleans, La.....	1,661	16	1,677	112	101	313	76,420
Nome, Alaska.....	.....	.....	.....	.....	.....	.....	.....
Pascagoula, Miss.....	.....	.....	47	.....	.....	8	439
Pensacola, Fla.....	104	75	179	.....	2	61	3,917
Perth Amboy, N. J.....	77	2	79	1	.....	22	2,123
Port Angeles, Wash.....	1	6	7	.....	1	1	122
Port Harford, Cal.....	67	.....	67	.....	.....	.....	2,406
Port Inglis, Fla.....	1	1	2	8	.....	.....	38
Portland, Me.....	148	61	209	3	1	3	6,693
Port Royal, S. C.....	.....	1	1	.....	.....	.....	8
Port Townsend, Wash.....	172	57	229	1	.....	59	39,514
Providence, R. I.....	25	9	34	.....	1	1	5,714
Delaware River (Philadelphia).....	762	59	821	9	.....	243	47,654
San Diego, Cal.....	467	3	470	31	.....	3	15,998
San Francisco, Cal.....	.....	.....	691	1	.....	201	89,794
Santa Barbara (Los Angeles, Cal.).....	.....	3	3	.....	.....	.....	68
San Pedro (Los Angeles, Cal.).....	194	2	196	.....	.....	7	10,559
Savannah, Ga.....	.....	.....	280	.....	.....	74	7,718
South Bend, Wash.....	.....	3	3	.....	.....	.....	33
St. Andrews, Fla.....	.....	.....	28	.....	.....	13	.....
St. George Sound.....	.....	.....	10	.....	.....	4	92
St. Johns River.....	19	37	56	216	.....	11	859
St. Josephs, Fla.....	.....	5	5	.....	.....	.....	93
Tampa Bay, Fla.....	.....	.....	185	2	8	44	5,413
Tacoma, Wash.....	22	.....	22	.....	.....	22	.....
Total.....	6,971	961	10,397	766	153	1,680	612,026

¹ On foot.² On trains.

REPORTS FROM NATIONAL QUARANTINE STATIONS.

During the fiscal year ended June 30, 1915, at the various stations in the United States a total of 10,397 vessels were inspected, including 1,680 disinfected, either for the destruction of mosquitoes as a precaution against the introduction of yellow fever or for the destruction of rats and other vermin as a precaution against plague.

In addition, 766 vessels were spoken and passed, making a grand total of 11,163 vessels and 612,026 passengers and crews passing under the observation of the service at ports in continental United States.

Following are the summaries of the operations at the various quarantine stations:

Alexandria, Va.—Acting Asst. Surg. Arthur Snowden in charge. One vessel was inspected and passed. At Alexandria, Va., the quarantine inspection is also made of vessels destined to Washington, D. C.

Atchafalaya, La.—Acting Asst. Surg. W. T. McClellan in charge.

Transactions.

Vessels inspected and passed.....	16
Vessels inspected and detained.....	3
Vessels detained and fumigated.....	3
Officers and crews inspected.....	158
Passengers inspected.....	6

No quarantinable disease was encountered during the year.

On the three vessels fumigated during the year, very few rats were found, although the vessels were carefully searched for them. The majority of vessels arriving at this port are regularly employed in the lumber trade.

Beaufort, S. C.—Acting Asst. Surg. C. G. Hay in charge. No transactions.

Biscayne Bay quarantine.—Post-office and telegraphic address, Miami, Fla. Acting Asst. Surg. James M. Jackson, jr., in charge. During the year 226 vessels were spoken and passed, 38 steamers and 88 sailing vessels were inspected and passed, and 1 steamer and 24 sailing vessels were disinfected for rats and passed. All vessels were required to rat guard all dock lines and fend off. These vessels carried a total of 7,153 passengers and crews.

There has been a notable diminution in the number of rats found in fumigating vessels. This is believed to be due to the regular fumigating once in four months, as directed by the bureau.

Boca Grande quarantine.—Post-office and telegraphic address, Boca Grande, Fla. Acting Asst. Surg. G. E. Atwood in charge.

Summary of transactions.

Vessels entering port.....	106
Spoken and passed.....	86
Inspected and passed.....	12
Fumigated for destruction of rats.....	7
Inspected and detained for completion of six days.....	1
Officers and crews inspected.....	671
Officers and crews of whom temperatures were taken.....	174
Total number of rats killed as result of fumigation.....	223

No quarantinable or reportable disease was encountered during the year. Typhoid vaccine was administered to six employees of the Lighthouse Service.

Boston, Mass., quarantine.—Post-office and telegraphic address, Gallops Island, Mass. Surg. S. B. Grubbs in charge.

The quarantine station of Boston, Mass., on Gallops Island, Boston Harbor, was transferred to the United States Public Health Service on June 1, 1915. This was the result of negotiations that have been under way for more than a year, and that resulted in the leasing to the Federal Government by the city of Boston of its quarantine plant. An appraisal of the property was made in order that it may be purchased from the city when an appropriation becomes available.

Boston is a large and growing port, but at present the foreign shipping and passengers especially are much reduced in numbers. These will undoubtedly increase with normal conditions, but will just as surely bring diseases that should, if possible, be excluded from this country.

In order that Boston may be prepared, it is planned to properly equip the newly acquired quarantine station. In addition to caring for the graver communicable diseases, it is also intended, at the request of the city health authorities, to care for communicable diseases such as scarlet fever, measles, diphtheria. This will enlarge the usefulness of the station without lessening its ability to deal with the graver infections, such as typhus fever, cholera, and plague.

It is possible to quarantine about 1,000 steerage passengers on the island in summer and a smaller number in winter. This capacity should be increased, and many improvements, such as better baths, a laboratory, fumigation, and disinfecting facilities, are needed. The two hospitals are adequate for the care of the sick.

A general overhauling of the station property has been begun preliminary to improving and enlarging the equipment.

Transactions.

	July 1, 1914, to May 31, 1915, administered by the city.	June 1 to June 30, 1915, admin- istered by Pub- lic Health Service.
Passengers inspected.....	31,139	966
Crew inspected.....	36,673	2,748
Vessels inspected and passed.....	658	65
Vessels fumigated.....	69	12
Patients treated:		
Smallpox.....	3	1
Malaria.....	1	
Chicken pox.....	2	
Impetigo.....	2	
Femoral adinitis.....	1	
Bronchitis.....	1	
Total patients.....	10	1
Passengers under observation.....	94	1
Total.....	104	2

Brunswick, Ga., quarantine.—Acting Asst. Surg. R. E. L. Burford in charge. During the year 18 vessels were spoken and passed, 16 steamers and 10 sailing vessels were inspected and passed, and 6 steamers and 3 sailing vessels were disinfected. There were 1,260 crew on steamers, 115 crew on sailing vessels, 4 passengers on steamers, and 4 passengers on sailing vessels.

Cape Charles quarantine.—Post-office and telegraphic address, Fortress Monroe, Va. Acting Asst. Surg. Ward B. MacCaffry in charge. During the year 1,219 steamers and 32 sailing vessels were granted pratique, 1,060 steamers and 27 sailing vessels inspected and passed, 125 steamers and 5 sailing vessels fumigated and passed, and 38 steamers passed on their medical officer's certificate.

The German auxiliary cruiser *Kronprinz Wilhelm*, from New York, arrived on April 11, 1915, after being 251 days at sea without making a port. There were 63 cases of beriberi among the crew on arrival and 31 new cases developed in the next three days, making a total of 94 cases. The cruiser was short of dry vegetables (beans, lentils, etc.) for a long period, and it was necessary to subsist the crew on a poorly balanced ration. The first case of beriberi appeared about December 15, 1914, and the last a short time after arriving in port, where a liberal and well-assorted diet was issued.

In the course of the 126 fumigations carried out during the year 2,021 rats were killed.

Microscopic examinations of blood were made in 12 instances to confirm the diagnosis of malaria in doubtful cases. In two cases of bacillary dysentery microscopic examinations of the feces were made to confirm diagnosis. Vessels were detained but a few hours.

Cape Fear quarantine.—Post-office and telegraphic address, Southport, N. C. Surg. M. K. Gwyn in charge.

During the year 62 vessels passed through quarantine. Of these 24 were fumigated with sulphur dioxide to destroy rats, vermin, and mosquitoes. As the vast majority of the vessels are in cargo, the practice has obtained of fumigating the superstructure with sulphur dioxide, 2 pounds per 1,000 cubic feet, six hours' exposure, counting from the closure of all compartments. The holds were fumigated in like manner by the pot method after the discharge of cargo at Wilmington, N. C.

To expedite the recovery of sulphur pots from the holds, a simple device was used on one of the steamers. It appears to be thoroughly practical, free from fire risks, and readily handled. The pots are slung on a light wire rope carrier leading up to a convenient point near the hatch cover. In practice the pots placed in the hold in the usual manner with a sling in place, and to remove them a lead rope at the hatch cover is hauled up and the pots come up one after the other without tilting or spilling their contents. Further experiments will be made and reported on later.

The masters of the vessels are given a copy of Public Health Bulletin No. 55, July, 1912, and their attention called to the proper method of putting on rat guards and breasting off at night while lying at the docks at Wilmington, N. C. The medical officer in charge of the marine hospital in Wilmington cooperates with the Cape Fear quarantine in enforcing the regulations relative to precautions against rats leaving vessels in department circular No. 37, July 10, 1912.

Transactions.

Vessels entered the port.....	62
Vessels spoken and passed.....	1
Vessels inspected and passed.....	37
Vessels fumigated.....	24
Total number of crews inspected.....	1, 664
Total number of passengers inspected.....	6
Ships arrived from South American ports with cargoes of nitrate of soda.....	8
Vessels had hold fumigated after discharge of cargo.....	3
Ships given provisional pratique subject to the sanitary supervision of the service officer in Wilmington.....	5

Charleston, S. C.—Passed Asst. Surg. H. M. Manning in charge.

Transactions.

Total vessels entering quarantine.....	148
Total steamers inspected and passed.....	137
Total sailing vessels inspected and passed.....	8
Steamers spoken and passed.....	3
Total vessels fumigated.....	15
Steamers fumigated.....	12
Sailing vessels fumigated.....	3
Total number of crew inspected.....	4, 053
Total number of passengers inspected.....	35

The amount of shipping entering Charleston has been reduced considerably by the war. The most important vessels entering this port from a quarantine point of view are those bringing saltpeter from the west coast of South America. Very little nitrate has been imported this year.

Smallpox has been quite prevalent in Charleston during the past year. At the request of the mayor the bureau authorized the station to receive smallpox patients from the city health officer. All expenses for such patients were paid for by the city.

In all 98 patients with smallpox were treated, most of these being very mild cases. Only 6 of these showed good vaccination scars, and 4 more were successfully vaccinated during the period of incubation.

Below is a tabulated statement of the smallpox cases treated during the year:

Total number of smallpox patients.....	98
Male, white	11
Male, colored.....	63
Female, colored.....	24
Number having good vaccination scars.....	6
Number having been successfully vaccinated during the period of incubation.....	4
Number discharged recovered.....	91
Number under treatment at end of year.....	7
Male, colored.....	4
Female, colored.....	3
Total number of days of hospital relief.....	1, 098

Columbia River (Oreg.) quarantine.—Post-office and telegraphic address, Astoria, Oreg. Passed Asst. Surg. H. G. Ebert in charge.

During the year 54 steamers and 87 sailing vessels were inspected and passed, 24 vessels were fumigated, and 4,123 crew and 352 passengers were inspected. No vessel has arrived during the year with quarantinable disease aboard. Four cases beriberi were reported to the local health authorities, being reported under local health laws.

Inspection of vessels from Seattle was continued as of last year, and in a number of cases vessels from this port were passed without inspection, they having been certified by telegram from the officer in charge at that port to avoid delay in cases of vessels arriving at night.

Vessels from dangerous localities, liable to harbor rats, have been fumigated as heretofore, unless fumigation was performed at port of departure and certified by the service or consular officer at that port.

There has been apparently a considerable increase in the number of vessels so fumigated at port of departure over that of last year.

The hulk *Concord* has been received and will be fitted up as detention barracks. The station force has been able to do considerable work in improving the station. Inspection of alien crews for immigration service was continued as heretofore without anything of unusual moment occurring.

Coos Bay quarantine.—Post-office and telegraphic address, North Bend, Oreg. Acting Asst. Surg. Ira B. Bartle in charge. During the year 1 vessel, carrying a crew of 10 and 2 stowaways, was fumigated and passed.

Cumberland Sound quarantine.—Post-office and telegraphic address, Fernandina, Fla. Acting Asst. Surg. J. Louis Horsey in charge.

The total number of vessels arriving at this port were 55. Of these, there were 20 foreign steamships, sailing from foreign ports via

domestic American ports, 6 sailing vessels from foreign ports, and 29 sailing vessels from domestic American ports. One vessel was spoken and passed.

No sickness was found on the vessels inspected, and none developed while vessels were at quarantine. Six sailing vessels were disinfected for the destruction of rats.

There has been a decided falling off in the number of vessels arriving, as the commerce of this port has been made up largely of vessels in the shipment of Florida phosphate rock and naval stores, and these shipments have been interrupted by conditions in Europe.

Darien, Ga., quarantine.—Acting Asst. Surg. C. J. Woods in charge. No transactions.

Delaware Bay and River quarantines.—Post-office and telegraphic address, Marcus Hook, Pa. Senior Surg. Fairfax Irwin in charge.

During the fiscal year ended June 30, 1915, the quarantine work on the Delaware River, except that done at the breakwater, has been conducted at Marcus Hook in conjunction with the work of the State officials at that place. The system of joint inspection was inaugurated in March, 1913, and has continued to give complete satisfaction to the shipping interests of the port of Philadelphia.

At the beginning of the fiscal year it was necessary to return to the sulphur method of fumigating vessels for the destruction of rats, owing to the transfer of the *Neptune* to New Orleans for use in plague eradication work at that port. The use of sulphur has made necessary the fumigation of some vessels in Philadelphia after unloading—the nature of their cargoes being such that the fumigation could not be done upon their arrival at Marcus Hook.

The shipping interests of the port are anxious to have the Harker system put into effect again, as it causes much less delay to their vessels than the sulphur method.

After the discovery of bubonic plague in New Orleans in June, 1914, and prior to the arrival of the *Neptune* at that port for the purpose of fumigating outgoing boats, all vessels arriving at Marcus Hook from New Orleans were required to stop for inspection and were either fumigated on their arrival or after unloading their cargoes at Philadelphia. Since the inauguration of the antiplague campaign in New Orleans and the fumigation of all vessels leaving there such vessels have not been required to stop at quarantine stations on the Delaware River.

In regard to the effect of the war in Europe on the quarantine work at this station, it may be said that the total number of vessels arriving has not been diminished to the extent that might be expected. Passenger traffic, however, has almost entirely ceased, the number arriving since October, 1914, being less than 1,000. A larger number of vessels than usual arrived in ballast to carry grain and general supplies to European ports.

The medical officer in charge has endeavored to put into effect a rule requiring all vessels arriving at this port to use rat guards and to raise their gangplanks at night. In this he has been assisted by the city health officer and by the director of the department of wharves, docks, and ferries. He has also had the cooperation of the majority of the shipping agents of the port, and it is hoped that in time this measure may be universally employed, as it is a protection both to the port and to the vessels themselves.

During the year the station at Reedy Island has been kept in first-class condition for use in case of an emergency which might require the detention of large numbers of persons. This contingency is likely to arise immediately upon the resumption of passenger travel between European ports and this city, and it is necessary that all the equipment of that station be kept in first-class condition in the future.

During the year no quarantinable diseases were discovered and no passengers or crews were detained for observation.

Summary of transactions at Marcus Hook Quarantine Station (and Philadelphia) for the fiscal year ended June 30, 1915.

Number of sailing vessels inspected and passed.....	59
Number of sailing vessels fumigated for destruction of rats.....	14
Number of steamers inspected and passed.....	762
Number of steamers fumigated for destruction of rats.....	202
Number of steamers spoken and passed or boarded and passed.....	9
Number of crew on sailing vessels.....	898
Number of crew on steamers.....	34, 943
Number of passengers on all vessels.....	11, 813
Number of passengers and crew vaccinated.....	55
Number of vessels fumigated at agents' request:	
Sailing.....	8
Steam.....	14
Number of steamers partially fumigated because of existence of infectious disease (measles) ¹	5

Delaware Breakwater quarantine.—Post-office and telegraphic address, Lewes, Del. Acting Asst. Surg. George G. Hart in charge. During the year 1 vessel was spoken and passed, and 48 steamers and 7 sailing vessels were inspected and passed. There were 1,435 crew on steamers and 76 crew on sailing vessels.

Eastport (Me.) quarantine.—Acting Asst. Surg. John E. Brooks in charge. There were 880 steamers and 49 sailing vessels inspected and passed. These vessels carried 60,265 passengers and crew. In addition to the above vessels, hundreds of smaller craft, motor and sailing, visited this port from all parts of New Brunswick and Nova Scotia.

Eureka, Cal.—Acting Asst. Surg. Charles C. Falk reports that during the year 10 steamers and 7 sailing vessels were inspected and passed.

Everett, Wash.—Acting Asst. Surg. James Chisholm in charge. During the year the crews of 4 vessels were examined, 3 steamers and 1 sailing vessel. The combined crews of these vessels totaled 110, 32 of which were white and 78 Chinese. All were free from contagious or infectious disease.

Georgetown, S. C.—Acting Asst. Surg. M. P. Moorner in charge. No transactions.

Gulf Quarantine Station.—Post-office and telegraphic address, Biloxi, Miss. Acting Asst. Surg. W. R. P. Thompson in charge.

Transactions.

Vessels entering quarantine.....	101
Inspected and passed.....	33
Spoken and passed.....	8

¹At request of New York quarantine officer after discharging remaining passengers at Philadelphia. These disinfections were done by the formalin-potassium permanganate method.

Fumigated and passed.....	60
Crew inspected.....	1, 506
Passengers inspected.....	18
Stowaways inspected.....	2

Hoquiam (Wash.) subport.—Acting Asst. Surg. R. F. Hunter reports that 69 sailing vessels, carrying 628 passengers and crew, were inspected and passed.

Key West (Fla.) quarantine.—Acting Asst. Surg. S. D. W. Light in charge. During the fiscal year 554 steam vessels, carrying crews totaling 31,006 persons and 18,205 passengers, and 62 sail vessels with crews aggregating 541 and 59 passengers, came under the jurisdiction of this station.

There were 28 steamers and 11 sail vessels fumigated for the destruction of rats, etc., and 1 steamer, the British steamship *Gileston*, from Algiers and Gibraltar, arrived at the station with two cases of smallpox in her crew.

The sick were taken off and treated on the hulk *Wistaria* and, fumigating the living quarters of this ship and vaccinating her personnel, the vessel was allowed to proceed to her destination, Galveston, Tex.

Ketchikan, Alaska.—Acting Asst. Surg. H. C. Story in charge. During the year 131 vessels were inspected and passed, together with 5,970 passengers and crew.

Mobile (Ala.) quarantine.—Passed Asst. Surg. William M. Bryan in charge. Post-office and telegraphic address, Fort Morgan, Ala.

There has been little change in the routine work of this station during the past year. The number of vessels has decreased from 663 to 608, and the number fumigated has decreased from 182 to 169.

Plague is still the disease which requires the greatest precautions at this port, but the cooperation of the service officers at the quarantine and the hospital station at Mobile with the city authorities has made it possible to permit the discharge of perishable cargoes from vessels at Mobile and the fumigation of the vessel after the discharge of the cargo, even when such vessels might be rat infested. This has been done by carefully rat guarding and fending off all vessels from the wharf. In addition to precautions against plague, an especially careful inspection has been made of vessels from European ports to detect typhus and cholera, but there have been fewer vessels from such ports than in previous years.

Below is a table showing the transactions for the year.

Vessels entering quarantine.

Steamers.....	431
Sailing vessels.....	177
Total.....	608
Vessels inspected and passed.....	421
Vessels inspected and detained.....	18
Vessels fumigated and passed.....	164
Vessels fumigated and detained.....	5
Total.....	608

New Orleans (La.) quarantine.—Surg G. M. Corput in charge. During the fiscal year the routine work at the New Orleans Quarantine

time Station exceeded that of any previous year in the history of the station. The number of vessels was more than double that of the previous year.

The outbreak of plague in New Orleans was in part responsible for the increased number of fumigations.

The New Orleans Quarantine Station furnished six expert fumigators for duty in plague eradication measures in New Orleans, and in addition the medical officer in charge was detailed to duty in New Orleans in connection with outgoing quarantine measures, and later to a general inspection of the Gulf Coast of Mexico.

Transactions.

	Number of ships.	Crew.	Passen- gers.
Steamers inspected and passed.....	1,276	47,740	11,759
Steamers fumigated and passed.....	274	12,059	251
Steamers detained to complete 6 days.....	76	2,160	301
Steamers detained to complete 6 days and fumigated.....	17	470	25
Steamers detained 6 days and fumigated.....	6	193	.....
Steamers detained for diagnosis.....	2	59	.....
Steamers' crew and passengers detained to complete 6 days.....	.....	2	2
Steamers fumigated outbound.....	8	166	.....
Sailing vessels inspected and passed.....	8	107	.....
Sailing vessels fumigated and passed.....	2	90	.....
Sailing vessels fumigated and detained 6 days.....	2	45	.....
Naval vessels inspected and passed.....	2	991	.....
Total.....	1,677	64,082	12,388
Vessels spoken and passed.....	112	.....	.....
Total number of vessels.....	1,789	.....	.....
Temperatures taken.....	784	29,884	7,700
Cases sick in hospital.....	.....	6	.....
Vessels fumigated.....	313	13,023	276

Nome, Alaska.—Acting Asst. Surg. D. S. Neuman in charge. No transactions.

Pascagoula (Miss.) quarantine.—Acting Asst. Surg. W. A. Cox in charge. Report of service transactions at the station for the year follows:

Vessels inspected and passed.....	47
Vessels fumigated.....	8
Officers and crew.....	434
Passengers.....	4
Stowaway.....	1

Pensacola, (Fla.) quarantine.—Acting Asst. Surg. W. Barnes in charge.

Transactions.

Vessels entering quarantine:	
Steamers.....	104
Sailing vessels.....	75
Total.....	179
Inspected and passed.....	118
Fumigated and passed.....	61
Provisional pratique (unloaded and then fumigated).....	7
Crew detained to complete quarantine.....	2
Officers and crew inspected.....	3,914
Passengers inspected.....	3
Total number of rats killed, result of fumigation.....	216
Percentage of vessels fumigated, approximately.....	30
Average rats per vessel killed.....	3.5

Perth Amboy (N. J.) quarantine.—Acting Asst. Surg. Charles W. Naulty, jr., in charge.

During the fiscal year care was taken to keep all boats as free as possible from rats, rat guards being insisted upon with most of the boats, and 22 vessels were fumigated in the holds, storerooms, and crew quarters after the cargo had been completely discharged. Since the beginning of the rat campaign it has been uncommon to find many rats upon the boats to this port.

Transactions.

Steamers inspected and passed.....	77
Sailing vessels inspected and passed.....	2
Steamers spoken and passed.....	1
Sailing vessels spoken and passed.....	0
Total	80
Passengers on steamers.....	6
Passengers on sailing vessels.....	0
Total	6
Crews on steamers.....	2,096
Crews on sailing vessels.....	21
Total	2,117
Steamers fumigated.....	21
Sailing vessels fumigated.....	1
Total	22

Port Angeles (Wash.) subport.—Acting Asst. Surg. Frederick T. Hyde in charge. There were 6 sailing vessels and 1 steamer inspected and passed, carrying 122 passengers and crew. There was 1 sailing vessel fumigated for the destruction of rats and other vermin.

Port Hartford, Cal.—Acting Asst. Surg. C. J. McGovern in charge. During the fiscal year there were 67 steamers inspected, carrying 2,406 crew, 27 of whom were vaccinated. No quarantinable disease was discovered.

Port Inglis (Fla.) quarantine.—Acting Asst. Surg. B. W. Burland in charge. During the year 8 vessels were spoken and passed and 2 vessels were inspected and passed. Those vessels inspected carried 38 passengers and crew. There were no vessels fumigated.

Portland (Me.) quarantine.—Surg. H. S. Mathewson in charge. There were 148 steamers and 61 sailing vessels inspected and passed and 2 steamers and 1 sailing vessel spoken and passed. These vessels carried 393 passengers and 6,300 members of crews. There were 3 vessels from ports infected with plague disinfected for the destruction of rats, viz, British steamship *Tronto*, January 24, 1915, 43 rats; British steamship *Largo Law*, April 19, 1915, 28 rats; British steamship *Ikala*, April 23, 1915, 9 rats. The dead rats collected from various parts of these vessels were autopsied but no evidence of plague infection was found among them.

The American steam yacht *Lyndomia*, with 4 passengers aboard, arrived at this port on September 2, 1914, with one case of infantile paralysis among the members of the crew. The vessel was fumigated

with sulphur, her holds, cabins, staterooms, and forecastle being subjected to SO_2 for 12 hours, then all places were washed down with a 1 to 1,000 solution of bichloride of mercury, and the case was removed to the United States marine hospital at this port.

Port Royal (S. C.) quarantine.—Acting Asst. Surg. Wm. P. Gibbes in charge. There was one vessel inspected and passed during the fiscal year.

Port Townsend (Wash.) quarantine.—Passed Asst. Surg. Baylis H. Earle in charge.

There was 1 steamer spoken and passed, 172 steamers inspected and passed and 22 detained, and 57 sailing vessels inspected and passed and 37 detained. The steamers carried a total of 16,740 members of crews and 21,185 passengers and the sailing vessels a total of 1,533 members of crews and 56 passengers. The vessels detained were fumigated with sulphur dioxide gas by the pot method for the destruction of rats and other vermin. The work was done in the bay of Port Townsend, except in the case of the U. S. Coast Survey steamer *Paterson*, which was attended to at the quarantine station at Diamond Point, Wash., at the request of the commanding officer, in order that the officers and men might sleep ashore and have their clothing and other effects disinfected. Nine steamers and 4 sailing vessels bound for Seattle and 3 steamers and 3 sailing vessels bound for Tacoma were granted provisional pratique, with the understanding that they would be fumigated at those ports when empty, the service officers there being notified by letter or telegraph. The crew of the U. S. Coast Guard cutter *Arcata*, 10 in number, were vaccinated.

Providence, R. I.—Passed Asst. Surg. E. R. Marshall in charge.

The quarantine ship *Newark* arrived at Providence, R. I., August 29, 1914, and after having been permanently anchored off Kettle Point in Providence Harbor, was officially transferred on August 31, 1914.

The *Newark*, which was one of the old Navy cruisers, is 311 feet long, 49 feet beam, and draws about 19 feet of water as she is now equipped. Her masts, funnels, guns, top hamper, and other miscellaneous articles were removed at the Norfolk Navy Yard, and in this condition she was towed to Providence by the U. S. Navy tug *Uncas*.

During the year the gun deck has been roofed over and an abundant area of skylight installed in the roof for lighting the interior of the vessel. Cedar shingles were used in the roof construction, in order that the water caught therefrom might be utilized for bathing, cooking, etc. The water from the roof is conducted by a system of galvanized pipes to the inner bottoms of the ship, from whence it is pumped by steam into the large gravity tank located on the boat deck. The tanks in the inner bottoms, now connected, have a capacity of about 50,000 gallons, and when it is considered that the prevailing charge for delivering water on board vessels in this harbor is \$2 per thousand gallons, the economy resulting from the present system is apparent. Except in case of an unforeseen emergency, it will never be necessary to purchase water for the use of the *Newark*.

In addition to the fresh water gravity tank of 2,500 gallons capacity on the boat deck, there is also a tank of the same capacity

which is used for salt water. This latter tank will supply the shower baths, urinals, toilets, and fire hydrants. There are washing, bathing, and toilet facilities for 800 persons on board, which will be adequate.

Disinfecting outfit.—This consists of two large steam and formaldehyde chambers, located on the gun deck in the forward part of the vessel. These chambers, which were shipped from another port, have been overhauled and are now in good condition. The steam for operating them is supplied by the donkey boiler.

Power plant.—All the power used in pumping fresh and salt water, running the winches, anchor engines, and heating the two berth decks is supplied by a 60-horsepower donkey boiler. Later this boiler will furnish the power to operate the dynamo for lighting the vessel during quarantine periods, and for operating the steam laundry.

Heating system.—The gun deck has a modern system of steam radiators, 1,500 square feet of radiating surface all told, and keeps the temperature up to a comfortable point even in extremely cold weather. The heating system on the berth deck will shortly be overhauled and put in good condition for the coming winter.

Lighting system.—At the present time there is no dynamo on board for generating electricity, although the vessel is partly wired.

Culinary outfit.—There is at present in the ship's galley a battery of three ranges capable of caring for about 500 steerage passengers. The food for the first and second class passengers will be cooked by separate ranges, which have been installed in the after part of the vessel. These two ranges will care for the ship's crew and about 75 passengers. The main dining room for steerage passengers will seat, as now arranged, 180 persons, but this can be increased considerably in case of necessity. The first and second cabin and ship's crew have separate dining rooms in the after part of the ship, which are ample for all needs.

Berthing equipment.—There are berthing accommodations for about 700 steerage passengers in the three-tier standee-bunks, though only 300 of the bunks have been equipped with mattresses. First and second class passengers can be berthed in the ward-room officers' quarters and midshipmen's quarters, where there are accommodations for about 40 persons.

Boarding launch.—The station has recently been furnished with a substantial 10-horsepower gasoline launch for boarding purposes.

Quarantine transactions.

Vessels entering quarantine.....	34
Steamers inspected and passed.....	24
Sailing vessels inspected and passed.....	9
Steamers inspected and fumigated.....	1
Vessels inspected and detained.....	1
Total number of crew inspected.....	2, 162
Total number of passengers inspected.....	3, 552
Number of persons vaccinated.....	556
Number of port sanitary statements issued.....	23

Reedy Island quarantine station.—Post-office address, Port Penn, Del. Telegraphic address, Reedy Island, Del. Pharmacist F. L. Brown in charge.

Plans have been drawn for a new barracks buildings to increase the capacity of the station for 1,050 additional persons. It will be a two-story building, size 120 by 70 feet. The first floor will be divided into six sleeping compartments, 75 persons each, one compartment with 30 shower baths, one compartment for toilets and washroom, a dining room, and kitchen. The second floor will be divided into eight sleeping compartments, 75 persons each, one compartment for toilets and washroom, one compartment for attendants, one compartment for a laboratory.

St. Andrews (Fla.) quarantine.—Acting Asst. Surg. J. A. Wells in charge. During the fiscal year 28 vessels entered this port, 13 of which it was necessary to fumigate for the destruction of rats. The method of fumigation has been by using sulphur and denatured alcohol.

St. Georges Sound quarantine.—Post-office and telegraphic address, Carrabelle, Fla. Acting Asst. Surg. B. B. Blount in charge. During the fiscal year 10 vessels passed through quarantine, 4 of which were fumigated with sulphur for the destruction of rats and rat fleas.

St. Johns River quarantine.—Post office and telegraphic address, Mayport, Fla. Acting Asst. Surg. Neil Alford in charge.

During the fiscal year 19 steamships and 37 sailing vessels were inspected, with a total of 14 passengers, 843 crew, and 2 stowaways; and 216 vessels were spoken and passed; and 3 steamships and 8 sailing vessels were fumigated. No quarantinable diseases were found. Five cases of typhoid fever and one case of malarial fever were present on different vessels, all of which were ordered sent to the hospital.

St. Joseph, (Fla.) quarantine.—Acting Asst. Surg. B. S. Stutts in charge. During the year 5 vessels were inspected, carrying a total of 93 passengers and crew.

San Diego (Cal.) quarantine.—Acting Asst. Surg. W. W. McKay in charge.

During the year 467 steamers or power vessels were inspected and passed, 31 Navy vessels (steamers) spoken and passed, making a total of 501 vessels arriving from foreign ports.

The ports of departure were mostly Mexican coast ports, the war having greatly curtailed arrivals from European ports.

The number of men in the crews of these vessels was 10,412 and the number of passengers 5,578.

There were three vessels fumigated for destruction of rats and a double stateroom on one large passenger steamer was disinfected on account of a case of smallpox occurring aboard. The case of smallpox was removed to the station and all provisions of paragraph 120, United States Quarantine Laws and Regulations, fully complied with. There were 220 pieces of bedding, belonging to the United States Army at Fort Rosecrans, disinfected.

Transactions.

Vessels spoken and passed.....	31
Steamers inspected and passed.....	467
Steamers disinfected	1
Steamers fumigated to kill rats	3
Sailing vessels inspected and passed.....	3

Sailing vessels disinfected	0
Sailing vessels fumigated to kill rats	0
Number of crew on steamers	10, 370
Number of crew on sailing vessels	42
Number of passengers on steamers	5, 578
Number of passengers on sailing vessels	8

San Francisco (Cal.) quarantine.—Post office and telegraph address, Angel Island, Cal. Surg. W. A. Korn in charge. During the year 692 vessels were passed, of which 664 were inspected and passed, 25 boarded and passed, and 1 spoken and passed. These vessels carried 89,794 persons, of whom 44,144 were members of crews of steam vessels, 2,226 members of crews of sail vessels, and 43,454 passengers. There were 201 vessels fumigated, of which 143 were steam vessels and 58 sail vessels, 18 of the steam vessels being fumigated with potassium cyanide and sulphuric acid, of which 17 were oil tankers and 1 a tramp steamer.

As a result of these fumigations 2,483 rats and 453 mice were killed, identified as follows:

Mus Rattus	746
Mus Alexandrinus	1, 078
Mus Norvegicus	30
Mus Musculus	453
Unidentified	629

During the course of the year 32 vessels were fumigated by request of the owners or agents.

From August 6 to August 11, 1914, all vessels from Eureka, Cal., were boarded and the entire personnel inspected on account of an outbreak of smallpox at that port.

Los Angeles and subports.—Senior Surg. S. D. Brooks in charge. This station includes three ports for quarantine inspection of vessels—San Pedro, Redondo, and Santa Barbara (including Gaviota).

Transactions.

	San Pedro.	Santa Barbara.
Steamers inspected	194	.....
Sailing vessels inspected	2	3
Total vessels inspected	196	3
Vessels fumigated	7	.....
Total passengers and crews inspected	10, 559	68

No case of quarantinable disease was found during the year. There were 7 vessels from Seattle fumigated for destruction of rats. Fumigation of vessels from South America and Asia was deferred on account of perishable cargo or because the holds were completely filled. Rat guards were used on all such vessels while in port and special precautions taken in watching cargo while being unloaded for evidence of rats.

Savannah (Ga.) quarantine.—Acting Asst. Surg. William J. Linley in charge. During the year 280 vessels, carrying 7,709 seamen and 9 passengers, arrived and 74 were fumigated, the remainder being released; and 129 vessels were released on condition that anti-

rat precautions be observed while at the wharf in Savannah. After the fumigations 542 dead rats were found and burned in the ships' furnaces.

South Bend (Wash.) subport.—Acting Asst. Surg. Francis W. Anderson in charge. During the year 3 sailing vessels were inspected and passed, carrying 33 members of crew and no passengers.

Tacoma, Wash.—Acting Asst. Surg. F. J. Schug reports that 22 steamships were fumigated during the year, including the U. S. torpedo-boat destroyer *Goldsborough*.

Tampa Bay (Fla.) quarantine.—Post-office address, Fort De Soto, Fla. Telegraphic address, via Palmetto, Fla. Passed Asst. Surg. H. J. Warner in charge.

Transactions.

	Number ships.	Tonnage.	Number crew.	Number passen- gers.	Tempera- ture taken.
Vessels entering quarantine.....	185	288,743	4,366	1,047	1,840
Vessels inspected and passed.....	131	189,331	3,119	1,015	854
Vessels fumigated and passed.....	44	79,887	1,065	32	844
Vessels held to complete 6 days.....	8	14,981	142		142
Vessels spoken and passed.....	2	4,544	40	.....	.....

No quarantinable disease was encountered during the year.

On account of the ravages of the fire at this station during June, 1913, the efficiency of the station has been greatly handicapped by lack of a wharf and disinfecting machinery.

Washington, N. C.—Acting Asst. Surg. John C. Rodman in charge. No transactions.

TEXAS-MEXICAN BORDER INSPECTION.

El Paso, Tex.—Acting Asst. Surg. John W. Tappan reports that during the year no trains carrying passengers crossed the international border at this port.

There were 1,370 vaccinations performed at the immigration station in the regular routine of immigration work.

Two cases of leprosy from Juarez were detected and returned to the Mexican authorities.

A strict watch for typhus, which is mildly endemic on the Mexican side, has been instituted, but no cases have been discovered crossing the international bridges, nor have any been reported in the city.

Brownsville, Tex.—Acting Asst. Surg. G. D. Fairbanks in charge. There were 400 aliens examined for the immigration authorities and 5 physical examinations of applicants for the Coast Guard Service, and 6 days' medical treatment for men in the same service have been rendered. An inspection of the Coast Guard station at Isabel, Tex. (about 30 miles from here) was made and its sanitary condition found to be excellent. The number of examinations is more than twice that for the previous fiscal year. There were 1,285 vaccinated on account of smallpox in Mexico, and all household goods coming over since March 20 were required to be certified free

from exposure to smallpox or properly disinfected by the United States consul. A 12-day period for quarantine detention on account of typhus in Mexico has also been established.

Eagle Pass, Tex.—Acting Asst. Surg. Lea Hume, in charge, reports that there were practically no quarantine transactions during the fiscal year, inasmuch as there was no through travel from Mexico during this period.

Practically all work of deportation was handled by him through the Immigration Service, where 9,883 aliens were examined, of which number 119 were debarred.

In view of the close watch kept on arriving aliens and travelers no quarantinable disease appeared on this side of the Rio Grande.

Laredo, Tex.—Acting Asst. Surg. H. J. Hamilton in charge. Quarantine operations during the year included the inspection of 177 passenger trains, and the inspection of 2,550 persons on these trains. A total of 16,066 persons were vaccinated because of the occurrence in Laredo between January 16 and April 24 of 204 cases of smallpox.

INSULAR QUARANTINE.

OPERATIONS OF THE SERVICE IN THE PHILIPPINE ISLANDS.

In the Philippine Islands the United States Public Health Service carries on an extensive and important work which may be divided into 6 divisions, namely: (1) National quarantine, (2) consular quarantine, (3) immigrant medical inspection, (4) physical examination of applicants for marine licenses and other government positions, (5) the sanitary maintenance of ports and vessels, and (6) miscellaneous functions not included in the first five.

Medical officers of the United States Public Health Service are stationed at 7 ports in the Philippine Archipelago, namely, Manila, Iloilo, Cebu, Zamboanga, Jolo, Cavite, and Olongapo.

Two quarantine disinfection and detention stations are maintained, one on Mariveles Bay, approximately 30 miles from Manila, in charge of a commissioned officer of the service, which is the quarantine station for the port of Manila and for such vessels as arrive in the northern part of the archipelago, and one on the island of Cautit, in the harbor of Cebu, about 4 miles from the city water front, which is used as the headquarters of the service at Cebu and is available for the treatment of infected vessels and their personnel which may arrive at any of the ports in the southern islands.

SANITARY CONDITIONS OF THE ORIENT.

The influence of America and American sanitary demands have improved the sanitary conditions of the Orient more than is generally realized. In this general improvement the enforcement of the United States quarantine laws and regulations has had a very important part. The influence of the measures which all vessels bound for United States ports are required to carry out at every port of call has produced in these cities an atmosphere favorable to such requirements. The agents of vessels also have demanded and required many sanitary improvements in foreign ports and even have had included

in the port regulations many new sanitary requirements which act as a protection to vessels and aid greatly in complying with the United States quarantine laws and regulations in those ports.

Disinfection stations have been installed by shipowners and other persons at a number of ports, and such quarantine measures, including bathing and disinfecting operations as well as the sanitary supervision of cargo by the United States officers, has had a widespread beneficent influence. While this improvement perhaps is a greater benefit to the Philippine Islands than to the continental United States, yet on account of the increasing trade it can not but be of great potential value to the Hawaiian Islands and the Pacific coast.

PLAGUE ON THE CHINA COAST.

The fiscal year opened with a widespread epidemic of plague along almost the entire China coast. In Hongkong the epidemic, in which occurred as high as 241 cases per week, had subsided to 50 cases per week in the beginning of the year, and this epidemic continued until October, 1914. No further cases were then reported until the spring of 1915, when plague again appeared, but not until several months later than in the preceding year. During the month of May, the month in which the epidemic reached its height in 1914, there occurred in 1915 only a few cases. The plague infection extended from Siam as far north as Shanghai, and the inspection of vessels which came to the Philippine Islands from that vast territory, only two or three days' sailing from badly infected ports, was a heavy responsibility. The measures which were imposed and which proved effective scarcely caused any interference with the movements of passengers and cargo, except on vessels that had cases of plague on board. Regular liners were fumigated every other trip and every practical precaution was taken, both at the port of departure and on arrival in the islands, to prevent the entrance of plague into the Philippines.

QUARANTINE AGAINST AMOY.

During this fiscal year an endeavor was made to handle the traffic from Amoy, from a quarantine standpoint, without the imposition of a period of detention, and therefore sailings between the Philippines and Amoy during the year under report were practically continuous, and no vessels were taken off the run during the plague season, while heretofore almost every year traffic was suspended for certain periods. At the opening of the year all vessels coming from Amoy to Philippine ports were required to call at the Mariveles quarantine station for inspection. Vessels from Amoy for other ports than Manila were required to undergo detention at Mariveles for a period sufficient to make seven days from the time they left Amoy. Vessels for Manila, after having completed the inspection at Mariveles and no quarantinable disease having been detected, were released from further quarantine detention at the station and proceeded to the quarantine anchorage at Manila, where they were again subjected to a thorough inspection, and if no suspicious cases were found the vessel was granted pratique. The epidemic of plague having subsided very early in Amoy, these restrictions were removed

September 26, 1914, since which time reliance has been placed on the inspections at Amoy and upon arrival in the Philippines without detention.

Plague again made its appearance in Amoy at the usual time in 1915, and so far the epidemic has been unusually severe both in Amoy and the near-by Provinces. No definite figures are obtainable, but reports which are thoroughly reliable show that at the close of this fiscal year deaths were occurring from plague in the city of Amoy at the rate of from 180 to 240 per week. As there has been no plague in the Philippines for nearly a year, the situation at Amoy, in view of the fact that almost every vessel brings several hundred passengers, certainly is a matter of concern to the Philippine Islands; but the service has inaugurated stringent measures, which it is hoped will prove effective without the necessity of holding vessels and their personnel in quarantine.

VESSELS FROM INDO-CHINA.

The prevalence of quarantinable disease in the ports of Indo-China becomes of considerable importance to the United States because of the constant arrival of vessels in the Philippine Islands which have either departed from or made ports of call in Indo-China. From Saigon large quantities of rice are shipped to the Philippines throughout the entire year, and from other ports in French Indo-China vessels load cattle for transportation to the different ports of the Philippine Islands. It has been the practice to require the fumigation of all rice vessels every trip they make between Saigon and the Philippines. Plague has been present in Saigon and vicinity with more or less virulence throughout the entire year, and a widespread epidemic of cholera has existed in Saigon and near-by territory and still persists.

COMMERCE WITH STRAITS SETTLEMENTS

The southern ports of the Philippines come in very close contact commercially with Borneo and with Singapore and other ports in the Straits Settlements. Cholera, plague, and smallpox prevailed in these countries, and consequently, from a sanitary standpoint, they constituted a real danger to the Philippines. One vessel arrived at Zamboanga with plague on board, but no spread of the disease occurred, as the quarantine regulations were rigidly enforced.

COMMUNICATION WITH AUSTRALIA.

The vessels of a number of steamship lines call at ports in the Philippines while en route from China and Japan to ports in Oceania and Australia, and also on the return voyage. Some of these vessels call at as many as 12 ports on their trip around the lower loop. The majority of these ports are uninfected with the ordinary quarantinable disease. From the quarantine standpoint it is fortunate that there are but few wharves alongside of which these vessels can berth. On these vessels it has been very rare to find quarantinable diseases when coming from the south on the Australian run. There was an outbreak of smallpox at the port of Sydney, which assumed at times

threatening proportions, and this outbreak gradually spread until a great number of places in the adjacent country became foci of small-pox infection. Sydney and New Castle, New South Wales, remained infected throughout the year. These cities are 105 miles apart, and both are port cities at which nearly all of the regular steamers bound for the Philippines call. The disease appeared in western Australia, but there was no spread. The type of smallpox which occurred seemed to be mild, and although from 30 to 60 cases per week occurred in New South Wales throughout the entire year no deaths were reported due to that disease.

The last report received at the close of the year showed all the Australian States to be practically free from the disease. Special precautions were taken with vessels from these infected ports and no introduction of the disease into the Philippines occurred from vessels arriving from the infected districts in Australia.

HOOKWORM AND OTHER INTESTINAL PARASITES.

During the fiscal year the examination made by the Public Health Service to detect cholera or cholera carriers, as well as hookworm and other intestinal parasites among the steerage passengers arriving from presumably infected ports showed about the same general findings as in previous years. This work had to be discontinued in part owing to the fact that the service was unable to have so many examinations made. There were, however, 1,469 examinations, with the following findings:

Specimens free from parasites	1, 086
Specimens containing parasites	333
Specimens containing uncinaria	49
Specimens containing ascaris	183
Specimens containing trichiuris	219
Specimens containing uncinaria, ascaris, and trichiuris	6
Specimens containing uncinaria and trichiuris	5
Specimens containing uncinaria and ascaris	6
Specimens containing ascaris and trichiuris	45

The number of noninfected specimens was about the same as heretofore, and is due largely to the treatment which the majority of the alien steerage passengers receive prior to their departure from foreign ports for an American port. Nearly all of the steamship companies now require all steerage passengers prior to the purchase of tickets to present certificates showing that they have been examined for hookworm and found negative.

EXAMINATIONS FOR CHOLERA CARRIERS.

In the preceding years all steerage passengers from cholera-infected ports, or those suspected of being infected, were required to have stool examinations made immediately upon their arrival in the Philippine Islands to determine whether or not they were cholera carriers. This procedure was discontinued in August, 1914, on account of the fact that the bureau of science could not handle the laboratory work required by this procedure. All examinations made of steerage passengers and others for hookworm were also examined for cholera organisms. During the year only one positive cholera vibrio carrier was found among the specimens examined.

CHOLERA CARRIERS AMONG CREWS OF BAY AND RIVER LAUNCHES AND LIGHTERS.

During the cholera epidemic in the city of Manila which occurred from July to October, 1914, the bureau of quarantine service adopted every possible measure consistent with the facilities at hand to prevent the occurrence of cholera on interisland vessels, on seagoing vessels anchored in Manila Bay, and on the cascoes, lighters, and launches plying in the harbor; and also to prevent cholera being carried by interisland vessels to other noninfected ports of the archipelago.

Among the measures adopted was that of keeping the small vessels, such as cascoes, lighters, launches, etc., free from cholera carriers by making continual inspections and stool examinations. Two thousand stool examinations were made, which resulted in the detection of 19 cholera carriers, who were removed to the San Lazaro Hospital, and the vessels thoroughly disinfected. The incidence of cholera carriers found in 2,000 specimens taken between August 19 and October 31, 1914, resulted as follows per hundred, in the order in which the specimens were examined, commencing with August 19:

Order in series.	Cholera carriers found.	Order in series.	Cholera carriers found.
1 to 100.....	4	1101 to 1200.....	1
101 to 200.....	2	1201 to 1300.....	0
201 to 300.....	3	1301 to 1400.....	0
301 to 400.....	2	1401 to 1500.....	0
401 to 500.....	0	1501 to 1600.....	0
501 to 600.....	0	1601 to 1700.....	0
601 to 700.....	1	1701 to 1800.....	0
701 to 800.....	2	1801 to 1900.....	0
801 to 900.....	4	1901 to 2000.....	0
901 to 1000.....	0		
1001 to 1100.....	0	Total.....	19

The percentage of cholera carriers among the vessel population was about the same as among the city shore population. The first 900 showed 2 per cent of carriers, the first thousand showed 1.8 per cent. In the second thousand which were taken during the declining weeks of the epidemic only 1 carrier per thousand was found. It was observed that cascoes and lighters that berthed in the canals showed the largest percentage of cholera carriers. The Binondo Canal between the Blanco Bridge and the Pasig River furnished a larger number than any other one locality.

Of the cholera carriers found on vessels none developed cholera and all were discharged from the observation hospital within 12 days after their admission.

It would appear to be a fair inference that the isolation of these carriers had an important effect in preventing the spread of true cholera from these small vessels to the larger vessels upon which their cargoes were to be loaded either for foreign ports or for other ports in the Philippine Islands.

CHOLERA IN MANILA.

There is every reason to believe that the outbreak of cholera in the Philippines which commenced during the first week in July, 1914,

was not due to introduction of the disease from foreign countries. The first cases occurred among natives of the islands who were permanent residents and had not come in contact directly or indirectly with foreign infection. No vessels arrived with cholera aboard. The outbreak began simultaneously in a number of widely separated places on the island of Luzon, almost on the same day during the first week in July. This service came in contact with cholera on vessels to a considerable extent during the cholera epidemic in the city of Manila. During the autumn of 1914 a number of vessels were treated in the harbor on account of cholera which appeared on board, the infection in each of these cases being directly traceable to the city of Manila.

CHOLERA ON VESSELS FROM FOREIGN PORTS.

Cholera was brought to the Philippines on a vessel from Saigon, which arrived at Cebu during June, 1915. The usual quarantine measures were taken and there was no spread nor did any secondary cases occur. The patient was treated in the hospital on the quarantine island at Cebu and recovered.

PLAGUE IN MANILA.

At the beginning of the fiscal year under report plague occurred in Manila at the rate of about one case per week, but thereafter very few cases of either rat or human plague occurred. The last case of human plague was detected September 12, 1914, and the last death from plague occurred September 14, 1914. Plague in rats continued until the severe flood which visited Manila September 3, 1914, which apparently drowned such rats as had formed the foci of plague infection among rats. From September, 1914, until June, 1915, although thousands of rats were examined weekly, no plague rat was discovered. During the latter part of June, owing to the extensive poisoning operations which were inaugurated in the city of Manila on a scale similar to that used in California cities, poison having been placed systematically from one end of the city to the other, a dead rat was found which had died from poison, but was afflicted at the same time with plague. The Philippine Health Service, formerly the bureau of health, maintained during the year a vigorous campaign against rats, and endeavored to minimize every possible cause of a plague outbreak in the city of Manila.

The ordinances for rat-proofing buildings, installing and covering garbage receptacles, and other measures to reduce the available amount of food supply for rodents have been carried out with a very satisfactory degree of success. There occurred in the city of Manila during the entire fiscal year four cases with four deaths from plague, which, it is believed, is the smallest number which occurred during a like period since American occupation. In this connection the increased cooperation and endeavors of private physicians and the public to assist in the prevention of further outbreaks of plague by promptly reporting and investigating cases which are even remotely suspicious has had much to do toward making Manila a sanely sanitary city as far as plague is concerned.

LEPROSY.

No quarantinable disease has been the subject of so much study and controversy during the past year, as far as the Philippine Islands are concerned, as leprosy. In fact, leprosy in the Philippines has become an international topic, owing to the apparent cures which have been effected by treatment with the chaulmoogra oil mixtures and the careful attention given to the patients in the hospitals and leper colony. The service officers on duty in the Philippines have had quite an interesting part in the wonderful work being carried out in connection with the segregation and treatment of lepers. During this and the preceding year more than 25 lepers have been or will be released from detention as having recovered, no active sign of the disease having been present now for a period of two years in those persons.

Leprosy was found on inspection upon 5 vessels upon arrival at ports in the Philippines. There were 10 vessels disinfected, either wholly or in part, on account of having had leprosy on board. The vessels used by the bureau of health for transporting lepers to the Culion leper colony were disinfected and fumigated at the Mariveles Quarantine Station. Officers of this service accompanied the leper-collecting vessels for the purpose of assisting in the diagnosis of the cases prior to their embarkation for Culion. No persons are embarked for Culion from any of the places at which they are assembled until after the most rigid investigations by several medical officers and positive bacteriological findings. The launches of the quarantine service are constantly pressed into service for transportation of lepers from one point to another near the several quarantine stations.

MEASLES.

Measles, while not a quarantinable disease, has a peculiar quarantine aspect, as far as the Philippine Islands are concerned. The type of measles which occurred in the past in the Philippine Islands has had no sequelæ and no mortality. The statistics for many years covering measles show that deaths do not occur. However, when measles are introduced from America, Shanghai, and other countries of the Temperate Zone, such new infection produces a type of measles with a high mortality. An infection which was imported into the Philippines during the year 1912 resulted in 841 deaths, and for the year ended December 31, 1913, there were 1,341 deaths from measles in the Philippine Islands, and during the year ended December 31, 1914, 417 deaths occurred in the Province and 27 cases and 1 death in Manila.

Careful investigations show that the measles causing the deaths above enumerated were traceable to infections introduced into the Philippine Islands from the outside. Measles continued to be brought by the Army transports, and in considerable numbers, as evidenced by the transport *Sherman*, which arrived February 3 with the following communicable diseases on board: Measles, 22 cases; mumps, 15 cases; whooping cough, 4 cases; scarlet fever, 1 case. An arrangement was entered into with the Army for handling infected transports and their personnel, and a system of quarantine is car-

ried out for the purpose of preventing the spread of the infection as much as possible. Commercial vessels and the passengers therefrom are treated in the same manner, there being at the close of this year a large number of passengers in quarantine at the San Lazaro Hospital who were exposed to measles on the steamship *Mongolia*.

Recommendation was made in the previous annual report that the service and the Medical Department of the Army in Washington take up the matter of measles and if possible evolve a plan of operations which would prevent measles infection from occurring on board the transports leaving the United States for the Philippine Islands.

SMALLPOX.

The same remarkable success in connection with the occurrence of smallpox on vessels was attained this year as during the past five or six years. By constant inspection and vaccination of all persons employed on vessels in the Philippine Islands the disease has been practically eliminated as a factor in the quarantine work in connection with interisland vessels. Smallpox did occur on five vessels. The steamer *Persia* arrived with a case of smallpox among the steerage passengers, the patient having embarked at Honolulu. Two cases of smallpox were also detected on the steamer *Ixion*, the first in the person of the ship's surgeon who had attended a number of smallpox cases which were landed at Jedda, and he having neglected to be vaccinated, developed the disease en route from Jedda to Manila. The other case on the same vessel was in the person of a fireman. At Cebu the steamship *Romulus* arrived with a case of smallpox on board.

TYPHUS FEVER IN THE ORIENT.

During the year the Philippines were seriously threatened with the introduction of typhus fever by reason of the severe epidemic of this disease which prevailed in Japan, particularly in the city of Tokio and surrounding prefectures. During the first week of this fiscal year there were 225 cases of typhus fever reported from the various districts of Japan. Typhus fever was also reported as having been present in several of the China coast cities. No cases of typhus fever were detected upon vessels arriving in the Philippine Islands. On account of the fact that passengers arrive from infected ports within the incubation period of the disease it is not impossible for a case in the incubation stage to pass quarantine without being detected by the usual methods of inspection. However, since all steerage passengers bound for the Philippine Islands were either bathed or carefully examined physically at the ports of embarkation or at the port of arrival, the danger was considerably minimized. The quarantine detention at the port of Yokohama by the Public Health Service of the United States was also a great protection against typhus being conveyed by vessels to the Philippines.

A number of cases of presumably typhus fever have been reported as occurring in Manila for the past four years, but so far the findings have been insufficient to warrant the statement that they were true typhus fever. There was, however, an outbreak at Dansalan, Mindanao, wherein 15 cases with 3 deaths from typhus fever occurred, the diagnosis having been confirmed by the United States Army

medical officers. It is possible that the disease may have been brought from Japan by laborers secured there for work on plantations in Mindanao, as vessels sailing from Japan to Australia have for some time been making Zamboanga a port of call, and considerable numbers of Japanese workmen have landed at Zamboanga for work on the Mindanao estates. It is proper to state, however, that this outbreak may have been of a similar nature to the cases which have more or less frequently occurred in the city of Manila, and which resemble typhus fever very closely.

PANAMA CANAL.

The opening of the Panama Canal has a distinct bearing on the Philippines, as the new avenue of traffic brings the eastern part of the United States closer to the Philippines by many miles. It also inaugurates a line of communication to the Philippines from the yellow-fever centers of the American Continent. Already a number of vessels have arrived in the Philippines which have used the canal as a waterway from the Atlantic to the Pacific. There is a possibility that vessels which have called at a number of yellow-fever infected ports might carry to the islands infected human beings or mosquitoes. The presence of the *Aedes calopus* (*Stegomyia* mosquito) throughout the islands renders possible the spread of the disease throughout this archipelago should it happen to be introduced. The danger is perhaps theoretical, but it is a factor which must be taken into consideration. All the vessels which arrived from the canal were subjected to careful fumigation at this port to destroy the mosquitoes which may have been on board.

The traffic through the canal will add considerable work to the Philippine quarantine service, both in connection with arriving vessels which have used the canal and vessels departing from the Philippine Islands which pass through the canal to the ultimate ports of destination. It is not the Canal Zone itself which would demand attention, but the ports in the contiguous territory where vessels are likely to call which make it necessary that the most careful measures be instituted to prevent the spread of yellow fever to the Orient, where the disease has never occurred, so far as is known.

MEDICAL INSPECTION OF ARRIVING IMMIGRANTS.

The Public Health Service in the Philippines also conducted the medical inspection of all aliens arriving at the insular ports and certified as such by the bureau of customs acting as immigration officers, in accordance with United States immigration laws. This work is conducted by the medical officers in addition to their other regular duties as quarantine and consular officers. A large amount of time is required in making examinations and reexaminations and in going to and from such places, as arriving aliens may be detained awaiting final disposition of their cases. While in the United States special officers are always detailed for this work and regular quarantine officers of the port do not take up the additional work included in the duties of the medical inspector of immigrants, in the Philippines this work is performed along with the other varied functions of the insular bureau of quarantine service. Special report on immigration appears under that subhead.

DAILY DOCK INSPECTION.

Another year of use has demonstrated the rat proofing on the new piers to be quite successful. It has been possible to keep these piers during the last seven years practically free of rats. Such rats as occasionally escaped from cargo which was placed upon the piers were captured and destroyed before they reached the shore. All vessels are required to enforce precautions to prevent rats from passing either from vessels to lighters alongside or to the piers, or from such lighters and the piers to the vessels.

A daily inspection is made to see that these requirements are carried out. The antagonism against carrying out antirrat measures is gradually disappearing. The agents and masters of vessels have realized that they are the gainers economically by having ships which are free from rats. Many vessels have now installed on board very expensive and elaborate fumigating machinery for the purpose of extinguishing fires and destroying vermin. All these measures tend to improve the sanitary condition of the ports and to lessen the means of transmission of disease.

GARBAGE FROM VESSELS IN PORT.

Considerable progress was made during the year in enforcing the regulations against the garbage of vessels anchored in port being dumped into the bay. For a while the large number of interned vessels, unfamiliar with the regulations of the port, gave trouble, but upon being made acquainted with the regulations they soon complied with them. Garbage from vessels floating ashore furnishes food for the rats along the water front. By preventing this, and by trapping and poisoning ashore, it has been possible to exterminate the rats from that district almost entirely.

AID TO OTHER SERVICES.

Direct aid was extended whenever possible to the different bureaus of the Philippine government, as well as United States services and the consular services of other governments in Manila. The character of some of the aid rendered may be outlined as follows: Bureau of agriculture, disinfection of vessels suspected of being infected with cattle diseases and supervision of arriving cargoes and hides; bureau of health, disinfection of vessels which had carried lepers, sanitation of interisland vessels, use of water transportation in the different ports of entry, assistance rendered by medical officers of this service to the medical stations of the bureau of health; bureau of customs, medical inspection of arriving immigrants, medical service for detained immigrants, physical examinations of officers applying for licenses in the Philippine marine service, and dispensary service for injured employees; board of food and drug inspection, examination of meat and meat products on incoming vessels and viséing the meat-inspection certificates of all shipments of meats and meat products from foreign countries to the Philippines; nautical school, physical examination of applicants; foreign consular service, preparation of bills of health and furnishing of sanitary data for the information of said officers in certifying persons and cargo destined to ports in the

countries which they represent; Weather Bureau, displaying of typhoon signals; Lighthouse Establishment, maintenance of a light in the vicinity of a quarantine station; bureau of constabulary, medical treatment by service officers.

A number of other services were rendered the Army and Navy, Coast and Geodetic Survey, and other bureaus, all of which were in some way or other beneficial to the sanitary conditions of the port cities.

VACCINATION.

There were 7,395 persons vaccinated by the maritime quarantine service in the Philippine Islands during the fiscal year under report. All steerage passengers arriving in the Philippines were vaccinated before being allowed to land. In this way persons new to a community where smallpox infection persists are protected prior to their entrance. The crews of all interisland vessels are regularly inspected and all of those not having good vaccination marks or service vaccination cards are vaccinated. This branch of the work is a most important one and necessitates the annual inspection of upward of 60,000 vaccination cards, but its efficiency has been demonstrated to the effect that while 15 years ago smallpox on interisland vessels was almost a daily occurrence, now for almost 4 years no regular members of the crews of interisland vessels have developed smallpox while so employed.

BAY INSPECTION WORK.

Quarantine inspection work at the ports in the Philippines is carried on from sunrise to sunset in connection with arriving vessels. In addition to the work performed on vessels prior to quarantine pratique being granted, the quarantine officers are kept busy supervising the sanitary conditions in the bay itself and on vessels anchored therein; investigating cases of sickness occurring aboard vessels berthed in the harbor; supervising the carrying out of the antirats regulations and also the sanitary condition of the cascoes, lighters, barges, and other small vessels which are used in loading and discharging vessels in the bay; and also the investigations and decisions with reference to cases of sickness which have occurred on interisland vessels during their voyages. There is also the duty in connection with the vaccination of the crews of the interisland vessels, the supervision and inspection of the sanitary conditions aboard such vessels while in port, the semiannual fumigation of all vessels, both large and small, the medical inspection of arriving aliens, and the daily inspection of the piers and water-front areas. This service also carries out all the disinfection work required by the bureau of health on such craft as may be berthed in the river and bay not adjacent to the shore or quays. This work has been conducted during the year without complaint from the public or the shipping interests. Less difficulty has been encountered during the past year in having the various requirements successfully carried out than heretofore.

FUMIGATION OF VESSELS.

To reduce to a minimum the possibility of plague being transmitted by vessels as well as to keep them in better condition for use by the

traveling public, the fumigation of vessels has been continued throughout the year. All vessels engaged in the interisland traffic were fumigated once each six months. Vessels engaged in the harbor traffic, such as launches and lighters, were also given periodical fumigation.

This work is done at Manila, Mariveles, Iloilo, and Cebu. Vessels bound for United States ports and vessels arriving from ports at which plague is present are fumigated for the purpose of killing any plague rats which may be on board. Vessels on the Hongkong, Manila, and Amoy run during the severe epidemic of plague which existed on the China coast were fumigated every other trip.

During the year the following vessels were so treated at the port of Manila:

Large steamers-----	102
Small steamers-----	50
Schooners-----	38
Launches-----	6
Motor vessels-----	5
Vessels from infected foreign ports-----	42
Total-----	263

CONSULAR QUARANTINE.

Another function conducted by the Public Health Service in the Philippine Islands is the carrying out of the work performed in foreign ports by the United States consular officers. By the quarantine regulations ports in the dependencies of the United States are considered for administrative purposes as foreign ports, and vessels are required to obtain therein consular bills of health and comply with the restrictions which are imposed on vessels at a foreign port of departure when sailing for a United States port. This work has been increasing from year to year in a multiple ratio to the increase of commerce on account of the greater number of vessels sailing and the great increase in the number of small shipments of cargo. The amount of work occasioned in connection with the issuing of consular bills of health and the carrying out of the various measures, restrictions, and regulations governing the passengers, cargo, and vessels can only be realized by those who have been actually engaged in such operations in a foreign country, where the traveling public is very decidedly opposed to any restrictions placed upon the movements of their persons or belongings. From September 22, 1914, until June 30, 1915, all steerage passengers leaving the Philippines for the United States or the Hawaiian Islands were required to furnish a certificate prior to being furnished transportation that they have been examined and found free from cholera organisms. In this work a number of cholera carriers were detected. Each year endeavors are made to reduce the interference with shippers and commerce to a minimum in carrying out this consular quarantine work. The transactions for the year in the Philippine Islands may be tabulated as follows:

Bills of health issued-----	436
Vessels inspected-----	247
Vessels disinfected or fumigated-----	22
Crew inspected-----	40, 207
Passengers inspected-----	32, 579
Pieces of cargo inspected and certified-----	2, 733. 819

RAT QUARANTINE.

The activities of the Public Health Service in the Philippine Islands included the carrying out of a very comprehensive work which may be classed under the term at quarantine. Work was accomplished both on the vessels themselves and on the piers and quays adjacent thereto. Every effort has been made to render all the vessels calling at ports in the Philippine Islands, whether foreign or domestic, as free as possible of animals which might transmit disease. All vessels engaged in the interisland trade were subjected to fumigation twice during the year. This treatment was also accorded to the launches, lighters, and vessels of a similar type engaged in the rivers and harbors of the port cities. At irregular intervals the rats recovered from fumigated vessels were sent to the laboratory for examination to determine whether or not they were plague infected. No plague-infected rats were found among the rats examined during 1915. In conducting this work the master of each vessel was furnished a blank, printed in three languages, on which to report the number of rats and mice, as well as spaces for enumerating any other animals which were killed, including roaches, spiders, centipedes, etc., in order that as correct a record as possible could be obtained. Some of these reports are not returned, as in the case of vessels which depart for foreign ports before all of the animals killed could be determined. However, reports were received from the majority of the vessels, and showed a great diminution in the number of rats found upon the vessels when compared with those of previous years. The foregoing reports showed the following animals to have been killed:

Animals destroyed.	Manila.	Cebu.	Iloilo.
Number of rats.....	1,598	51	108
Number of mice.....	293	22	21
Number of lizards.....	7	.....	.....
Number of scorpions.....	7	.....	.....
Number of liters of roaches.....	1,320	192	78
Number of liters of red ants.....	41	.....	12
Number of large spiders.....	35	.....	10
Number of centipedes.....	66	6	33

The question of the transmission of rats in cargo has been given further study and consideration. In view of the large shipments to the Philippines of potatoes, onions, garlic, and similar vegetables which are packed in open crates and baskets, also glassware and crockery which is packed in loose straw, the subject of rats in such cargo is a pertinent public-health question. Last year receivers of cargo shipped from the plague-infected districts in China were served with circulars, printed also in the Chinese language, advising the receivers that such cargo had been packed in plague centers and instructing them to use the greatest caution while unpacking to ascertain whether or not packing cases contained rats, mice, fleas, or other small animals. Inquiries among the importers elicited the information that it was very rare to find any animals in packed cargo. However, employees in the warehouses where cargo is stored state that they have seen rats which apparently came from imported

cargo; also a dealer in vegetables stated that at certain times quite a number of rats were known to have been imported into the local warehouse in crates of potatoes. Efforts to compel the shippers to use rat-proof containers have met with only partial success, owing to the great expense occasioned by the use of special containers. Considerable satisfaction is had over the success already attained, and it is a pleasure to say that every year sees a decided improvement, and if these improved conditions continue the next decade should see all cargo practically rat proof, as far as containers themselves are concerned.

MEAT-INSPECTION CERTIFICATES.

When the food and drugs act was passed it became necessary for some officer of the Government to be responsible in connection with determining as to the validity of the certificates presented with all shipments of meats and meat products into the Philippine Islands from abroad. This work was assigned to several bureaus, but owing to the fact that the offices of most of the bureaus of the insular government are open only part of the time, owing to the short office hours a large percentage of the year and two days of every week (Saturday and Sunday), the board of food and drug inspection asked the bureau of quarantine service to take over the work, on account of the fact that its offices are kept open all day every day of the year, including Sundays, holidays, and Saturday afternoons. This work is carried out both on the vessels during the inspection of the manifests of arriving ships and also in the quarantine offices at the several ports of entry.

FLOATING EQUIPMENT.

The quarantine service in the Philippine Islands maintained, as heretofore, a number of launches and boats. The launch *Zapote* was rebuilt during the year at a cost of approximately \$4,000 and is now in first-class condition. The steam launch *Mercury*, which was out of commission at the beginning of the last fiscal year, was rebuilt and a gasoline engine installed. The foregoing two vessels are used at the port of Manila in conducting the quarantine boarding work. Cebu, Iloilo, and Mariveles are each provided with one launch. They were in commission practically the entire year and were kept in a fair state of repair. A large rowboat which had been used at Mariveles for some years is being rebuilt and converted into a gasoline launch, an engine having been procured during the year for the purpose. The work on this project is being performed by the regular employees of the Mariveles quarantine station.

BUILDINGS.

Building operations were in progress during the entire year at the quarantine stations at Cebu and Mariveles. At Mariveles the reinforced concrete barrack building which was undergoing construction during the preceding year was completed. The total cost of the building was \$8,500. It will accommodate 300 steerage passengers, and is divided into two separate units, each with appropriate equip-

ment. At Cebu the sum of \$5,500 was available for the construction of a disinfecting building to replace the one formerly used which had become practically unserviceable. This building was constructed by the bureau of public works and has been completed. Practically the entire fund was expended, or will be expended when all the outstanding accounts have been presented for payment. This building provided a house for the installation of the disinfecting machinery and a small storeroom and an office room. One of the principal objects in constructing this type of building at Cebu was to furnish a shelter for the persons on the quarantine island in case of storm, the experience of the past having shown that in case of a severe typhoon there was on the island no safe place for the officers and employees to remain during a storm. It will be remembered that during the typhoon of October 15, 1912, the entire island was submerged to a depth of more than 4 feet, and as all of the buildings were very seriously damaged at that time their safety since has been a question of conjecture. This building being constructed of reinforced concrete, the maintenance charges will be practically nil. The other buildings at the several stations were repaired considerably during the year. The damages by dry rot, insects, and storms in the Philippine climate are unusually great. The new concrete structures will last indefinitely and impose practically no maintenance costs. As fast as funds become available all of the wooden buildings will be replaced with concrete structures and thus eliminate for the future the large fixed charges of the past for maintenance and repairs.

PERSONNEL.

The Public Health Service in the Philippine Islands was under the charge of Surg. Victor G. Heiser until March 1, 1915, when Surg. J. D. Long was appointed chief quarantine officer for the Philippines and took charge of the service operations.

Surg. Long was also appointed by the insular government as director of health, which position places him in charge of the insular bureau of health and its various activities. The bureau of health by a recent law has been succeeded by the Philippine health service.

Five commissioned medical officers of the Public Health Service were assigned to duty in the Philippine Islands and five acting assistant surgeons were employed for duty at Philippine ports. Officers are stationed at Manila, Mariveles, Iloilo, Cebu, Zamboanga, Cavite, and Olongapo.

The officers on duty in the Philippines and their several stations were as follows:

Surg. John D. Long, chief quarantine officer, in charge of the bureau of quarantine service.

Manila: Surg. J. D. Long, Asst. Surg. R. H. Heterick, Asst. Surg. W. E. Glanville, Pharmacist N. C. Comfort.

Mariveles: Asst. Surg. H. M. Thometz.

Cebu: Asst. Surg. J. H. Linson.

Iloilo: Acting Asst. Surg. S. K. Carson.

Olongapo: Acting Asst. Surg. U. R. Webb.

Cavite: Acting Asst. Surg. W. A. Angwin.

Jolo: Acting Asst. Surg. L. H. Hansen.

Zamboanga: Acting Asst. Surg. C. R. Haig.

There were 64 other employees engaged in conducting the service work at the several quarantine stations and in the office of the bureau of quarantine service for the Philippine Islands at Manila.

There were quite a number of changes in the employees of the service during the year. Resignations were frequent, and all of the vacant positions but three were filled.

FUNDS AVAILABLE FOR PUBLIC IMPROVEMENTS.

At the beginning of the fiscal year there were on hand four funds which had previously been provided for public works and improvements. There was a balance of \$1,367.33 in the fund for reconstructing the Mariveles Wharf, a balance of \$4,900 remained in the fund for constructing a disinfecting building at the Cebu Quarantine Station, \$4,497.36 for a barracks at Mariveles, and \$3,000 for rebuilding the service launch at Manila. In addition, the legislature at its session in 1914-15 appropriated the sum of \$1,500 for necessary repairs to buildings. The work on the first three projects was pushed to completion and practically all the funds expended. The fund for launch reconstruction was also entirely expended for the purpose appropriated. During the fiscal year the sum of \$131.20 was expended from the repair fund, and the balance remains on hand available until used.

The conditions of the clusters of fender piles in front of the Mariveles Quarantine Station wharf are such that a new fender system must be installed at the earliest practicable date. The new concrete wharf can not stand the impact of large vessels which come alongside, and the danger of serious damage occurring without proper fender protection is very great. An appropriation will be asked for the purpose of constructing a new fender system, in amount approximately \$8,000. At the close of this fiscal year the service in the Philippines has on hand a less amount of money for public works than at any time during the past 10 years. Plans are being considered to replace the cabin-passenger barracks, the attendants' quarters, and the hospital as soon as practicable with reinforced concrete structures. The steerage bathhouse will also require a new reinforced concrete floor.

CURRENT APPROPRIATIONS.

At the last session of the Philippine Legislature the sum of \$55,285 was appropriated for the fiscal year 1915 for the expenses of carrying out the various functions of the public health service in the Philippine Islands. This was \$6,000 less than the amount for the preceding fiscal year. The appropriation act further reduced this appropriation by a paragraph prohibiting the expenditure of more than 95 per cent of the total amount appropriated, thus making the total amount available \$52,522.75. This amount was divided into two funds—\$40,000 for salaries and wages and \$15,285 for contingent expenses. This amount of money is not adequate for conducting the service in the most efficient manner, but the service is being conducted in the best manner possible under the circumstances.

CAVITE AND OLONGAPO.

During this year very few vessels called first at Cavite or Olongapo. Nearly all the vessels consigned to the United States Navy have called first at Manila for pratique. Vessels of the Navy, both combatant and noncombatant, which arrived from foreign ports at Cavite and Olongapo were inspected and treated at those ports in accordance with the regulations. For the convenience of the Navy and in order to avoid delays to their vessels, medical officers of the Navy stationed at those ports were authorized to give clearance to vessels and report the results of such inspections. No infected vessel arrived at either port during the year. No further plague-infected rats have been discovered at Olongapo, and the measures taken during the previous year proved very efficient in reducing the rat infestation both ashore and aboard the vessels in that port. The statistics for the work at Cavite and Olongapo as reported were as follows:

Vessels inspected.....	6
Crew inspected.....	481
Passengers inspected.....	47
Bills of health issued.....	4

CEBU QUARANTINE STATION.

Cebu is an inspection, detention, and disinfection station. The service has an office in the customhouse, but makes its headquarters on Cautit Island, which is in Cebu Harbor about 4 miles from the city water front.

The quarantine inspection work was carried on in the same uniform manner as at the other ports in the Philippines. During the presence of cholera in other ports of the islands in the latter part of 1914 vessels from such infected ports were required to undergo quarantine inspection upon arrival at Cebu. No cases of cholera were detected at quarantine on interisland vessels, nor did any occur in the city of Cebu or adjacent territory during the fiscal year. One case of cholera was brought to Cebu on a steamer from Saigon. The case was removed to the quarantine station and there treated until recovery. The usual measures were taken with the vessel and crew, but no additional case occurred. Smallpox also occurred on a vessel which arrived at the Cebu quarantine station. The case was treated in the quarantine station hospital and recovered. No further cases occurred on the vessel after the usual treatment. There were 34 vessels fumigated at the Cebu station for the purpose of destroying disease-carrying animals and insects, and 2 vessels were disinfected on account of having quarantinable disease on board.

The usual medical inspections of arriving immigrants were made; applicants for marine licenses were examined; bills of health were issued to vessels proceeding to both American and foreign ports; and the medical officer in charge, in addition to his quarantine duties, conducted a free clinic in the eye, ear, nose, and throat department of the Southern Islands Hospital, and also made a survey of the children of the public schools of the city of Cebu for the purpose of taking such measures as were indicated to reduce the number of cases of trachoma among the school children and to minimize, if possible, the further spread of the disease.

The employees of the quarantine station, during the time they were not engaged in actual quarantine work or the necessary work incident to the care and preservation of the station and its equipment, constructed an additional breakwater and reinforced those previously built. To prevent the strong waves of the southwest monsoon from further undermining the left side of the breakwater constructed last year, tiers of barrels filled with rock and gravel were buried at the shore end of the breakwater, and they have so far effectually retarded the undermining.

The transactions of Cebu may be partially listed as follows:

Vessels inspected from Philippine ports.....	14
Vessels inspected from United States ports.....	5
Vessels inspected from foreign ports.....	115
Vessels disinfected on account of disease.....	2
Vessels in quarantine.....	2
Vessels fumigated to destroy vermin.....	34
Crew inspected on arriving vessels.....	8, 241
Cabin passengers inspected on arriving vessels.....	660
Steerage passengers inspected on arriving vessels.....	1, 150
Persons detained in quarantine under observation.....	180
Persons vaccinated at quarantine.....	120
Cases of cholera at the quarantine station.....	1
Cases of smallpox at the quarantine station.....	1
Seamen examined for licenses.....	34
Bills of health issued to vessels for United States ports.....	81
Bills of health issued to vessels for foreign ports.....	37

ILOILO QUARANTINE STATION.

Iloilo is maintained as an inspection station only at the present time. No quarantinable diseases were detected on arriving vessels. All vessels which berthed at the quays were required to be fended off and to wear approved rat guards. All the vessels in the inter-island trade calling at Iloilo were fumigated twice during the year. The number of rats obtained at the fumigation considerably diminished. The sanitary condition of the city greatly improved during the year and measures are now being taken to even further improve the sanitary condition of the low places along the water front which heretofore were difficult to maintain in a good sanitary state. The danger at Iloilo from plague rats getting ashore is very great, because the vessels come up the river and berth alongside the river wall, practically in the heart of the city. All such vessels were inspected twice daily to see that all the regulations were carried out. Iloilo has been without disinfection facilities since December, 1913. The disinfecting plants which theretofore were installed on the disinfecting barge are now stored under a small shelter for which rent is paid, and since the legislature reverted to the treasury the fund for a disinfecting building at Iloilo the apparatus will doubtless be useless for another year. It will be necessary if a vessel required extensive treatment to remand the same to Mariveles or Cebu.

Iloilo has become a shipping point of much importance, owing to it being in the center of the great sugar producing districts, and the increased production of the past years has, of course, augmented the shipping proportionately. The future bids fair to see a further increase, as the new sugar centers which have been provided by both private and government funds are now, or soon will be, in full operation.

The statistics for the year at Iloilo were as follows:

Vessels inspected.....	47
Vessels disinfected or fumigated.....	305
Bills of health issued.....	197
Crew inspected.....	2, 645
Passengers inspected, cabin.....	510
Passengers inspected, steerage.....	169

JOLO AND ZAMBOANGA.

Jolo and Zamboanga as ports of entry, from a quarantine standpoint, increased in importance during the past year, by reason of the number of additional steamship lines calling at those ports. One line from Japan and a number of smaller vessels have substituted for the German lines which formerly made regular trips between Jolo and Zamboanga and ports in Oceania and the south-eastern Asiatic coast, and in view of the fact that many of the ports from which vessels arrive at Jolo and Zamboanga are almost constantly infected with cholera and plague, the danger of introducing quarantinable diseases is constantly present.

There were a few cases of cholera reported in the vicinity of Zamboanga, and also on the island of Jolo, but so far there has been very little spread of the disease.

The statistics for the year at Jolo were as follows:

Vessels inspected.....	45
Bills of health issued.....	55
Crew inspected.....	2, 739
Passengers inspected, cabin.....	133
Passengers inspected, steerage.....	406

The statistics for the year at Zamboanga were as follows:

Vessels inspected.....	24
Bills of health issued.....	40
Crew inspected.....	1, 897
Passengers inspected, cabin.....	259
Passengers inspected, steerage.....	1, 301

MANILA STATISTICS.

The work at the port of Manila was varied, as heretofore. A study of the statistics will show that the amount of work done and the results attained were satisfactory. •

The following table shows parts of the transactions on Manila Bay and in the office of the service in the city of Manila, but does not include the work accomplished at Mariveles, which is the disinfection and detention station for the port of Manila:

Vessels inspected from United States ports.....	104
Vessels inspected from foreign ports.....	504
Vessels disinfected on account of diseases.....	24
Vessels in quarantine.....	4
Vessels fumigated to destroy vermin.....	263
Crew inspected on arriving vessels.....	49, 342
Cabin passengers inspected on arriving vessels.....	12, 255
Steerage passengers inspected on arriving vessels.....	29, 520
Persons detained in quarantine under observation.....	230
Persons vaccinated at quarantine.....	8, 767
Cases of plague at quarantine.....	
Cases of smallpox at quarantine.....	16

Cases of cholera at quarantine.....	5
Bills of health issued to vessels for United States ports.....	249
Bills of health issued to vessels for foreign ports.....	464
Pieces cargo certified.....	1, 733, 819
Meat certificates viséed.....	4, 822
Rats found on fumigated vessels.....	1, 598
Stool examinations made for cholera carriers.....	3, 469
Stool examinations made for hookworm.....	1, 469
Applicants for marine licenses physically examined.....	168
Vessels inspected in port.....	560

MARIVELES QUARANTINE STATION.

The quarantine station at Mariveles continued to be a very busy place during this year, as heretofore. The quarantine against Amoy during the plague season was the occasion of a large number of vessels calling at Mariveles for inspection and fumigation. For the first time in many years the station has not had to provide shelter for many persons detained in quarantine. Three vessels having had smallpox occur on board were treated at the station and five vessels which had been used for transporting lepers to the leper colony were disinfected throughout. The free dispensary maintained for the benefit of the inhabitants of the village of Mariveles and surrounding territory was kept open on the quarantine reservation every day throughout the year. The medical officer in charge of the Mariveles quarantine station also acted as health officer for the municipality.

A campaign against malaria and mosquitoes and also a sanitary survey with regard to the existence of intestinal parasites was conducted over a portion of the fiscal year and is still in progress. The results show a very high percentage of infection. The employees of the station were occupied when not engaged in actual quarantine work in the construction of the steerage passenger barracks and also completing the buildings on the new wharf which was constructed during the previous year.

The following table shows partly the work of the station :

Vessels at station.....	34
Vessels disinfected and fumigated.....	10
Persons bathed and effects disinfected.....	509
Pieces of baggage disinfected.....	2, 116
Persons vaccinated.....	604
Persons held in quarantine.....	134
Crew and passengers inspected.....	2, 840

Statistical table—Incoming national quarantine.

Port.	Steamers in-spected.	Sail ves-sels in-spected.	Total vessels in-spected.	Vessels quaran-tined.	Vessels fumi-gated and dis-infected.	Total passen-gers and crew in-spected.
Manila.....	606	2	608	11	297	91, 117
Cavite and Olongapo.....	6	.....	6	.....	528	.....
Iloilo.....	44	1	45	.....	305	3, 324
Cebu.....	134	.....	134	2	36	10, 051
Zamboanga.....	24	.....	24	1	1	3, 457
Jolo.....	45	.....	45	.....	.....	3, 278

Financial statement, Philippine quarantine service.

GENERAL CURRENT APPROPRIATIONS.

Appropriation, Act 2319, for 6 months	\$30,568.50
Appropriation, Act 2431, for 6 months	27,642.50
Accounts payable prior fiscal years	179.33
Total	58,390.33
Expended during fiscal year	54,528.56
Unexpended balance, general funds	3,861.77
Total	58,390.33
Outstanding obligations	3,000.00
Collections during fiscal year	1,558.50

PUBLIC WORKS AND PERMANENT IMPROVEMENT FUNDS.

Funds:	
Reconstruction Mariveles wharf, balance	1,367.40
Barracks, Mariveles, balance	4,497.36
Disinfection building, Cebu, balance	4,900.00
Repairs, buildings, Act 2494	1,500.00
Launch repairs, Act 2378	3,000.00
Total funds	15,264.76
Expended:	
Reconstruction Mariveles wharf	1,367.33
Barracks, Mariveles	4,436.28
Disinfection building, Cebu	4,819.67
Repairs, buildings, Act 2494	131.20
Launch repairs, Act 2378	3,000.00
Total expended	13,754.48
Balances:	
Reconstruction Mariveles wharf	.07
Barracks, Mariveles	61.08
Disinfection building, Cebu	80.33
Repairs, buildings, Act 2494	1,368.80
Total balance	1,510.28

COMBINED EXPENDITURES.

From general funds, current appropriations	54,528.56
From public-works funds, special appropriations	13,754.48
Total	68,283.04

Expenditures by station.

MANILA.

General service expenses	\$19,680.42
Launch expenses	11,338.30
New station equipment	120.62
	31,139.34

MARIVELES.

General service expenses	10,396.74
Repairs to building and wharves	1,237.10
Launch expenses	274.65
New construction and equipment	6,743.39
	18,651.88

ILOILO.

General service expenses.....	\$2, 591. 08	
Launch and barge expenses.....	2, 103. 80	
		\$4, 694. 88

CEBU.

General service expenses.....	5, 263. 13	
Launch expenses.....	2, 604. 54	
Repairs, buildings and wharves.....	297. 99	
New construction and equipment.....	4, 858. 28	
		13, 023. 94

JOLO.

General service expenses.....	521. 50
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ZAMBOANGA.

General service expenses.....	251. 50
	68, 283. 04

OPERATIONS OF THE SERVICE IN PORTO RICO.

Service operations in Porto Rico for the fiscal year ended June 30, 1915, embraced quarantine, marine-hospital relief, medical inspection of immigrants, and miscellaneous duties.

The service maintains quarantine stations at San Juan, Ponce, Mayaguez, Arecibo, Aguadilla, Fajardo, Humacao, Arroyo, Guanica, and Jobos (Aguirre). Immigration inspection is done at all these ports, but marine-hospital relief is furnished only at San Juan and Ponce.

Quarantine is the most important phase of the service operations in Porto Rico. The medical officer in charge at San Juan is chief quarantine officer for Porto Rico, and has under his supervision and direction all quarantine matters at the other ports. At San Juan is maintained the only quarantine station in Porto Rico, located on Miraflores Island, in San Juan Bay. It is equipped with quarters for noncommissioned officers and attendants, detention quarters, disinfecting and fumigating apparatus, etc. An office is maintained in San Juan.

Summaries of transactions.

San Juan :

Steam vessels inspected.....	250
Sailing vessels inspected.....	81
Vessels held in quarantine.....	44
Vessels fumigated.....	77
Net tonnage of vessels fumigated.....	52, 052
Sulphur consumed..... pounds.....	19, 609
Rats and mice killed.....	252
Packages of cargo fumigated to kill rats.....	31, 097
Crew inspected.....	17, 024
Passengers inspected, incoming.....	4, 498
Passengers inspected, transit.....	13, 221
Passengers detained for observation.....	359
Total number of days passengers in quarantine.....	1, 092
Cases of sickness (nonquarantinable) occurring among passengers in quarantine.....	6
Bills of health issued.....	302
Immigrants inspected.....	2, 571
Immigrants certified.....	17

San Juan—Continued.

Certified immigrants landed	14
Certified immigrants deported	2
Certified immigrants held pending	1
Service patients treated in hospital	139
Days relief furnished	2, 560
Service patients treated at out-patient office	334
Times relief furnished	524
Medical inspection of seamen, etc	61

Ponce:

Steam vessels inspected	70
Sailing vessels inspected	36
Vessels held in quarantine	16
Vessels fumigated	3
Packages of cargo fumigated to kill rats	3, 908
Crew inspected	5, 900
Passengers inspected, incoming	254
Passengers inspected, transit	6, 812
Passengers detained for observation	None.
Bills of health issued	101
Immigrants inspected	100
Immigrants certified	None.
Service patients treated in hospital	6
Days relief furnished in hospital	77
Service patients treated at out-patient office	24
Times relief furnished	62

Mayaguez:

Steam vessels inspected	113
Sailing vessels inspected	40
Vessels held in quarantine	30
Packages of cargo fumigated to kill rats	3, 520
Crew inspected	5, 853
Passengers inspected, incoming	790
Passengers inspected, transit	4, 000
Bills of health issued	63
Immigrants inspected	195
Immigrants certified	None.

Arecibo:

Steam vessels inspected	4
Crew inspected	166
Passengers inspected, incoming	5
Passengers inspected, transit	126
Bills of health issued	13
Immigrants inspected	4
Immigrants certified	None.

Aguadilla:

Sailing vessels inspected	4
Crew inspected	29
Passengers inspected, transit	5
Bills of health issued	7

Fajardo:

Steam vessels inspected	6
Sailing vessels inspected	7
Crew inspected	132
Passengers inspected, incoming	29
Passengers inspected, transit	1
Bills of health issued	17
Immigrants inspected	4
Immigrants certified	None.

Humacao:

Steam vessels inspected	4
Sailing vessels inspected	6
Crew inspected	93
Passengers inspected, incoming	31
Bills of health issued	13
Immigrants inspected	None.

Arroyo :	
Sailing vessels inspected.....	1
Crew inspected.....	6
Passengers inspected, incoming.....	21
Bills of health issued.....	8
Guanica :	
Steam vessels inspected.....	132
Sailing vessels inspected.....	1
Crew inspected.....	5,590
Passengers inspected, incoming.....	862
Immigrants inspected.....	209
Immigrants certified.....	3
Certified immigrants deported.....	3
Jobos (Aguirre) :	
Steam vessels inspected.....	1
Crew inspected.....	32
Bills of health issued.....	14

Special yellow-fever measures.—Owing to the occasional appearance of yellow fever at ports of Venezuela, vessels from these ports en route to the United States and Spain are held in quarantine, but during their short stay in Porto Rico are allowed to transact business under certain restrictions while anchored in the bay. Non-immune passengers who can not show evidence of having left such ports six days before arrival in Porto Rico are detained in quarantine to complete the six-day period.

On rare occasions there are vessels from infected or suspected ports of Trinidad, Brazil, etc., which are treated in similar manner.

Outgoing plague quarantine.—After the eradication of plague in Porto Rico, the outgoing quarantine restrictions were modified on different occasions until at present the measures are fumigation of vessels for the destruction of rats every six months, and the use of rat guards on the lines when vessels are moored alongside piers.

Bills of health.—Bills of health are issued by service officers at Porto Rican ports to all vessels destined to ports in the United States, and to foreign ports when the master of the vessel so desires.

Fumigation of vessels.—Under the provisions of bureau circular of August 4, 1913, vessels from certain ports have been fumigated before being allowed to dock. They are mostly small sailing vessels from West Indian ports.

Vessels from these ports, which make Porto Rican ports only as ports of call, are prohibited from docking, but are allowed to transact business while at anchor in the bay, provided precautions are taken to prevent rats being carried ashore.

Vessels coming within the requirements of fumigation at six-month intervals are fumigated at San Juan or at the United States port, as may be most convenient.

Fumigation of cargo.—The fumigation of cargo for rats, which was put into force during 1913, has been continued in the same manner. At San Juan hydrocyanic gas is used; at Ponce and Mayaguez, sulphur dioxide gas.

Quarantinable diseases.—During the year the only quarantinable disease present in Porto Rico has been leprosy. Lepers are isolated on Cabras Island, at the entrance of San Juan Bay, as soon as the diagnosis is positively made. At present there are 39 patients so segregated.

PLAGUE ERADICATION.

No human or rodent plague has been reported in Porto Rico during the year.

The laboratory examination of rodents has been continued by the sanitation service of the insular government. The weekly statements from July 1, 1914, to June 30, 1915, show 15,125 rats, 3,232 mice, and 9 mongoose examined, with negative results. The majority of these rodents were caught in San Juan and the suburbs of Puerta de Tierra and Santurce.

At the request of the Governor of Porto Rico Surg. W. W. King, in addition to his duties as chief quarantine officer, was detailed as member of the Institute of Tropical Medicine and Hygiene of Porto Rico, organized for the study of diseases peculiar to that country and climate.

OPERATIONS OF THE SERVICE IN HAWAII.

The operations of the service in the Hawaiian Islands, under the direction of the chief quarantine officer with headquarters at Honolulu, were as follows:

1. Quarantine.
2. Plague laboratory.
3. Marine Hospital.
4. Immigration.

GENERAL.

The quarantinable diseases continued to prevail at the greater portion of the foreign ports touched at by vessels arriving at Honolulu, but only one vessel arrived during the year with the history of having had quarantinable disease on board.

Plague, which threatened to assume epidemic proportions in Hong-kong at the beginning of the fiscal year, was soon under control, while cholera rapidly disappeared from Manila.

The present European war disorganized the regular fumigation of vessels in foreign ports, and many vessels, in particular a score of German ones, arrived without any papers, and for military and naval reasons refused to give any information as to their previous whereabouts. All of these vessels were detained for fumigation and afterwards held in quarantine a sufficient period to cover the incubation of plague, as the vessels came from oriental ports originally.

Vessels inspected.—Five hundred and fifty-one vessels were boarded and inspected by service officers upon arrival at the following ports of entry in the Hawaiian Islands, namely: Honolulu, 499; Hilo, 18; Mahukona, 10; Kahului, 16; Lahaina, 1; Makaweli, 7; and Koloa, none.

Port sanitary statements.—Five hundred and four certificates were issued at Honolulu, 108 at Hilo, 10 at Mahukona, 88 at Kahului, 1 at Lahaina, 7 at Makaweli, none at Koloa, to vessels bound for United States and foreign ports.

Vessels fumigated.—Ninety-seven vessels were fumigated at Honolulu and 54 at Hilo for the purpose of rodent extermination, while 12 vessels were fumigated at Honolulu and 1 at Kahului for the destruction of mosquitoes.

The instructions contained in department circular letter No. 37, of June 10, 1912, in regard to rat guards were strictly enforced during the year. The daily inspection of vessels for the proper observance of the rat-guard requirements was continued and very little difficulty was encountered in enforcing the regulations.

Nearly every vessel calling at Honolulu during the year was equipped with standard 36-inch rat guards and only very exceptionally is the small European 12-inch guard to be seen.

Honolulu is the only port in the Hawaiian Islands where vessels from foreign ports discharge their cargoes directly onto the wharves. At the port of Hilo there is a wharf capable of berthing vessels drawing 30 feet of water, but it has been used but little during the year. At all the other ports vessels lie in the stream and discharge their cargoes directly into lighters.

VESSELS ARRIVING WITH CONTAGIOUS BUT NONQUARANTINABLE DISEASES ON BOARD.

Beriberi.—During the year 81 cases of beriberi were discovered on arriving vessels, in some instances there being quite a number of cases on each vessel, as, for instance, the Japanese steamship *Kiyo Maru* during the voyage from Japan had 30 cases occur amongst the Chinese steerage passengers. The steamship *Anyo Maru* arrived from the west coast of South America with 22 of the crew and 1 passenger ill with the disease, while there were 8 cases on the Japanese battleship *Idzumo*. With the exception of the American steamship *Manchuria* and *Korea*, all the cases occurred on Japanese steamers.

Measles.—Four vessels arrived with this disease on board, there being two cases on the *Shinryo Maru*, one on the *Manoa*, and one on the transport *Sherman*.

There were two cases of varicella and one of cerebrospinal meningitis landed at this port during the year. All of the cases were reported to the board of health for their action before granting pratique to the vessel affected.

CHOLERA CARRIERS.

The examination of all steerage passengers from Manila, consisting almost entirely of Filipino laborers and their families being brought into the Territory under contract to work on the sugar plantations, for cholera carriers was continued from the beginning of the fiscal year until November, 1914, when the certificates of the Manila Bureau of Science were accepted and the examination upon arrival at Honolulu discontinued.

Filipinos to the number of 208 were examined from July, 1914, to November 25 of the same year, and no carriers were found.

PLAGUE IN HAWAII.

During the year plague continued to prevail only on the island of Hawaii, where it has been present for the past 15 years, the infection remaining, as in previous years, localized in the Hamakua district.

Two cases of human plague occurred at Paauhau Landing, the first being in the person of a Portuguese in charge of the landing, which occurred August 16, 1914, and the second in the person of a Filipino working at the landing on June 29, 1915. Only one plague-

infected rat was found throughout the year, this rat being found dead at the Kalopa stables of the Paaupau Sugar Co. on August 29, 1914.

The Territorial board of health and the plantations have worked with the object of building the rat out of existence. All stables, stores, and warehouses have been rendered rat proof, while double walls and houses with floors resting on the ground have been banished from the Hamakua district.

The following table shows the rat yield and cases of human and rat plague in the Hamakua district for the year:

Month.	Rat yield.	Human plague.	Rodent plague.
July.....	7,890		
August.....	10,053	1	1
September.....	7,804		
October.....	11,145		
November.....	8,800		
December.....	8,708		
January.....	11,723		
February.....	10,860		
March.....	10,951		
April.....	9,902		
May.....	12,834		
June.....	11,701	1	
Total.....	122,371	2	1

AID RENDERED OTHER GOVERNMENT SERVICES.

Board of health.—Five cremations were done during the year at the quarantine station for the board of health, all of which were persons dying of leprosy.

Many inoculation and cultural experiments were made in the laboratory for the board of health in suspected cases of plague, cholera, typhoid, and pneumonia, while a large amount of media was prepared and swabs sterilized for the use of the bacteriologist of the Territorial board of health.

Queen's Hospital.—Several Widal examinations were made in the laboratory upon request of authorities of Queen's Hospital.

United States Coast Guard.—Ten seamen were treated at the outpatient office and 44 in the hospital during the year.

Two commissioned officers of the United States Coast Guard were physically examined for promotion.

RAT CAMPAIGN—HONOLULU.

Twenty-two thousand seven hundred and ninety-seven rats and mongoose were taken in the district of Honolulu during the year, 22,521 being trapped, 254 being killed by sulphur dioxide, and 22 being found dead or being brought in by outsiders.

There was a reduction in the number of rats trapped of 732 over that of the preceding year, which was due to the dropping of one of the trappers in order to keep the sum allotted for this work.

With regard to the classification of the rodents caught, *Mus Alexandrinus* continued to furnish the largest number, there being 10,592

of this variety, followed in numerical order by 7,657 *Mus musculus*, 2,947 *Mus norvegicus*, and finally 1,158 *Mus rattus*.

In view of Honolulu's close commercial relations with the Orient, mainland ports of the west coast of the United States, and, through the opening of the Panama Canal, with the Gulf and east coast ports and, to a less extent, with the west coast of South America, the importance of the rat campaign in Honolulu becomes most marked.

None of the wharves where cargo is discharged or taken on are rat-proof, and there is not a rat-free warehouse in the city. Therefore by the regular trapping and examination of rodents in the city and along the wharves, plague, if it occurs, will be promptly detected and the work of control rendered much easier.

Quarantine transactions at Honolulu, Hawaii.

Vessels inspected and passed.....	450
Vessels boarded and passed.....	49
Vessels inspected and detained for fumigation for mosquitoes.....	12
Vessels inspected and detained for fumigation for rat quarantine.....	18
Vessels inspected and detained for observation.....	1
Vessels inspected and detained and allowed to transact business in quarantine.....	7
Vessels fumigated for rat quarantine.....	79
Vessels fumigated by request.....	1
Vessels arriving with quarantinable disease or having had same on board during the voyage.....	2
Number of passengers inspected and passed.....	77, 703
Number of passengers detained.....	None.
Number of crew inspected and passed.....	60, 536
Number of crew detained.....	None.
Number of cases of contagious diseases cared for.....	3
Number of port sanitary statements issued.....	504
Number of Canal Zone bills of health issued.....	18
Number of rats and mice killed on vessels by fumigation.....	325
Number of persons detained and examined for cholera carriers.....	208
Number of carriers found.....	None.
Number of inspections of vessels for observance of rat-guard precautions.....	808
Number of vessels on which cargo was inspected for rat signs.....	144
Number of pieces of freight inspected and passed.....	27, 312
Number of hides disinfected.....	8, 286
Number of autopsies.....	5
Number of cremations.....	5
Number of mongoose and rats trapped and destroyed.....	22, 797

Quarantine transactions at subports.

	Hilo.	Kahului.	Mahukona.	Lahaina.	Makawale.	Koloa.
Vessels inspected and passed.....	18	16	10	1	7	.....
Vessels fumigated for rat quarantine.....	53					.....
Vessels fumigated for mosquitoes.....		1				.....
Passengers inspected and passed.....		10	3			.....
Crew inspected and passed.....	509	333	136	10	97	.....
Number of port sanitary statements issued.....	108	88	10	1	7	.....
Canal Zone bills of health issued.....	18					.....
Baggage inspected and passed.....					2	.....
Baggage and freight disinfected.....	192					.....
Number of hides disinfected.....	4, 512					.....
Number of hides inspected and passed.....				277		.....
Number of empty cement and plaster bags fumigated.....	17, 125					.....
Number of barrels of glue stock disinfected.....	54					.....

Plague laboratory.

Total rats, mice, and mongoose taken.....	22, 797
Rats trapped.....	22, 082
Mongoose trapped.....	449
Rats found dead.....	12
Rats killed by sulphur dioxide.....	254
Examined macroscopically.....	4,027
Examined microscopically.....	18, 770
Showing pest infection.....	None.
Classification of rats trapped:	
Mus alexandrinus.....	10, 449
Mus musculus.....	7, 599
Mus norvegicus.....	2, 942
Mus rattus.....	1, 092
Classification of rats found dead:	
Mus alexandrinus.....	4
Mus musculus.....	4
Mus norvegicus.....	4
Mus rattus.....	
Classification of rats killed by sulphur dioxide:	
Mus alexandrinus.....	139
Mus musculus.....	48
Mus norvegicus.....	1
Mus rattus.....	66
Total number of rat trappers.....	8
Decrease in number of rats, mice, and mongoose caught as compared with last year.....	732
Number of traps set daily.....	1, 085

FOREIGN QUARANTINE.

The duties of officers of the Public Health Service detailed at foreign ports are as follows:

1. The determination of the sanitary history of all vessels destined for ports in the United States, its possessions and dependencies.

2. The inspection of vessels, crews, and passengers, and the certification of freight, with special reference to the opportunities afforded at foreign ports of infestation of either vessels or freight by rodents.

3. The fumigation of ships for the destruction of rats and mosquitoes, or the disinfection of ships when necessary in the event of actual infection.

4. The observation, when necessary under detention, of intending passengers for ports in the United States and its dependencies.

5. The rendition of reports by means of cable or telegraph, when necessary, as to the health and sanitary conditions of the foreign port and, when possible, of the country contiguous thereto.

6. The certification, in conjunction with the United States consular officer of the bills of health issued, said certificates to be made just prior to the departure of the ship and to cover the requirements provided for by the United States quarantine regulations.

Table giving foreign, oriental, and insular stations and transactions for the fiscal year ended June 30, 1915.

Stations.	Total number of vessels inspected.	Number of vessels fumigated.	Total number of passengers and crews inspected.
Aguadilla, P. R.	4	—	34
Arecibo, P. R.	4	—	297
Arroyo, P. R.	1	—	27
Callao, Peru	177	156	21,362
Cavite, P. I.	6	—	528
Cebu, P. I.	134	36	10,051
Fajardo, P. R.	13	—	162
Guanica, P. R.	133	—	6,452
Habana, Cuba	1,263	468	118,890
Hilo, Hawaii	71	53	509
Hongkong, China	367	127	55,061
Honolulu, Hawaii	499	109	138,239
Humacao, P. R.	10	—	—
Iloilo, P. I.	47	305	3,324
Jolo, P. I.	45	—	3,278
Kahului, Hawaii	16	1	343
La Guaira, Venezuela	127	—	16,751
Makaweli, Hawaii	7	—	97
Mahukona, Hawaii	10	—	139
Manila, P. I.	608	308	91,117
Mayaguez, P. R.	153	—	10,643
Messina, Italy	10	—	180
Naples, Italy	335	—	28,626
Ponce, P. R.	106	3	12,966
Salina Cruz, Mexico	—	3	—
San Juan, P. R.	331	77	34,743
Shanghai, China	164	15	34,057
Vera Cruz, Mexico	33	7	1,918
Zamboanga, P. I.	24	2	3,457
Lahaina, Hawaii	1	—	10
Jobos (Aguirre), P. R.	1	—	32
Tampico, Mexico	135	62	—
Progreso, Mexico	63	—	3,508
Tuxpam, Mexico	86	86	—
Total	4,984	1,818	596,801

CALLAO, PERU.

Acting Asst. Surg. J. L. Castro-Gutierrez reports as follows:

During the fiscal year 177 vessels were certified, of which 156 were fumigated and 21 simply inspected and passed. These vessels carried 12,328 crew and 5,740 cabin and 3,294 steerage passengers.

It was necessary to vaccinate 2,210 persons coming from localities infected with smallpox. During the year 2,181 pieces of baggage were disinfected and 132 pieces inspected and passed. Certificates were granted to 29 shipments of skins which had been previously disinfected. Of the various consignments of hides shipped during the year 9,824 were certified as disinfected. Three sick passengers were refused embarkation on account of the following diseases: Smallpox, 1; leprosy, 1; plague (suspected), 1.

The sanitary condition of Lima and Callao is reported much improved over the last fiscal year. There were only 16 cases of plague at Callao during the past year. It is the current opinion that the decrease in the disease was owing to private effort to better the sanitary conditions in general. The number of cases of smallpox increased during the year, the cause being, in the opinion of some, the dry condition of the vaccine supply. Cases of plague are reported constantly to occur at Molendo.

HABANA, CUBA.

Acting Asst. Surg. Richard Wilson reports as follows:

Summary of transactions.—Bills of health were issued to 1,618 vessels bound for the United States and its dependencies. This is an increase of 100 over the last fiscal year. This gives an average of almost 135 per month. The smallest number of bills of health issued in one month was 112 in February, 1915, closely followed by January, 1915, which had 116. The largest number, 168, was issued in June, 1915. After February the numbers of bills of health issued increased steadily.

Of the 1,618 vessels receiving bills of health, 1,263 were inspected, because they were going direct to the United States or its dependencies. The other 355 vessels were not inspected, because they were going to the United States via Cuban or other foreign ports.

On the vessels inspected the number of the crews was 76,124; the number of the passengers was 42,766.

On the vessels not inspected the number of the crews was 14,819; the number of the passengers was 5,101.

This makes a total of crews on the vessels of 90,943, and a total of passengers of 47,867.

Of these passengers 43,332 were going to the United States and its dependencies.

This fiscal year shows a slight decrease in the number of passengers, compared with last year. This is probably due to the European war.

In Table No. 1 comparison is made of the work of this year with last year.

TABLE NO. 1.

	1913-14	1914-15	Increase.
Vessels inspected.....	1,166	1,263	97
Vessels not inspected (via foreign ports).....	352	355	3
Total bills of health issued.....	1,518	1,618	100
Members of crews of outgoing vessels inspected.....	61,976	76,124	14,148
Passengers on outgoing vessels inspected.....	43,706	42,766	940

¹ Decrease.

That the work of this office has increased steadily during the last five years is shown in Table No. 2.

TABLE NO. 2.

	1910-11	1911-12	1912-13	1913-14	1914-15
Vessels inspected.....	816	986	1,107	1,166	1,263
Vessels not inspected (via foreign ports).....	328	200	370	352	355
Total bills of health issued.....	1,144	1,186	1,477	1,518	1,618
Members of crews inspected.....	46,921	53,617	59,199	61,976	76,124
Passengers inspected.....	37,802	40,730	43,915	43,706	42,766

The only certificates issued during this fiscal year were vaccination certificates for the Canal Zone and Panama, of which there were 114.

Fumigations of vessels for the purpose of killing rats was practiced throughout the fiscal year. Fumigations are divided into two classes: First, vessels fumigated by the service; this includes all vessels going direct to the United States. Second, vessels fumigated by the Cuban authorities under the supervision of the service; these

are vessels going to the United States via Cuban ports. In the latter case the service fumigator is sent on board, and if he sees that the vessel is fumigated according to the regulations he reports so, and a certificate to that effect is issued to the vessel.

In addition to the fumigations made in Habana, some vessels are recommended for fumigation at a United States port, either on arrival in quarantine or when empty. This has been done for various reasons, among them (1) vessels arriving at Habana partly loaded with the object of finishing loading here, the nature and bulk of the cargo being such that it was not practicable to fumigate; (2) vessels in which the fumigation at Habana had failed and while tampering was suspected it could not be proved; (3) vessels loading in violation of the local regulations and applying for a bill of health (or for fumigation) after they were loaded, when the nature and quantity of the cargo made fumigation at Habana impossible without unloading at least a part of the cargo.

In Table No. 3 a comparison is made of the fumigations of the last three fiscal years.

TABLE NO. 3.

	1912-13	1913-14	1914-15
Vessels fumigated by the service.....	360	202	468
Vessels fumigated by the Cuban authorities under the supervision of the service.....	108	86	127
Vessels recommended for fumigation at a United States port.....	44	25	80

Permits for embarking crated fruit or other merchandise liable to harbor rats were issued after inspection. Most of these permits were for fruits, especially pineapples, but household goods, furniture, and other merchandise were inspected before embarking:

The permits issued in 1914-15 were.....	2, 904
The permits issued in 1913-14 were.....	1, 713

This shows an increase of..... 1, 191

This comparison, however, is not accurate, because the figures for 1913-14 were for 4 months only (March to June, 1914, both included), whereas the figures for 1914-15 were for 10 months, inspections having been made all the year except during the months of December, 1914, and January, 1915. With the new outbreak of plague in February, 1915, the inspections were begun again. These permits were for "lots" not for "pieces," and sometimes several thousand crates were included in one permit.

Inspection of railroad cars for shipping loaded to the United States is a new service begun this year in February, when the new ferry-boat *Henry M. Flagler* began running. Table No. 4 shows how this work has increased.

TABLE NO. 4.

	January.	February.	March.	April.	May.	June.	Total.
Railroad cars inspected.....	59	212	270	428	501	1, 470
Railroad cars disinfected.....	13	9	.....	.....	22
Total cars shipped to the United States.....	59	225	279	428	501	1, 492

General summary of transactions.

1. Vessels inspected	1, 263
2. Vessels not inspected (via foreign ports)	355
3. Total bills of health issued	1, 618
4. Members of crews inspected	76, 124
5. Members of crews not inspected	14, 819
6. Total members of crews	90, 943
7. Passengers inspected, embarking in Habana	35, 646
8. Passengers inspected, in transit	7, 120
9. Total passengers inspected	42, 766
10. Passengers not inspected, embarking in Habana	2, 051
11. Passengers not inspected, in transit	3, 050
12. Total passengers not inspected	5, 101
13. Total passengers (sum of 9 and 12)	47, 867
14. Passengers for the United States and its dependencies (included in 13)	43, 332
15. Passengers for the United States certified after detention at Tricornia	None.
16. Vaccination certificates issued for the Canal Zone and Panama	114
17. Other vaccination certificates	None.
18. Certificates of immunity to yellow fever	None.
19. Health certificates	None.
20. Vessels fumigated	468
21. Vessels fumigated by Cuban authorities under the supervision of the service	127
22. Vessels recommended for fumigation on arrival at United States port	80
23. Baggage disinfected	pieces. None.
24. Baggage inspected	do. None.
25. Total baggage handled	do. None.
26. Permits issued for embarking crated fruit, etc.	2, 904
27. Railroad cars inspected	1, 470
28. Railroad cars disinfected	22
29. Total railroad cars shipped to the United States	1, 492

Bills of health for Vera Cruz.—From the beginning of the fiscal year the Habana office issued bills of health for Vera Cruz, Mexico, and treated vessels for that port just as if they were going to the United States. This was in compliance with State Department Circular No. 306, General Instructions, Consular, dated Washington, D. C., May 23, 1914. This circular also directed that the bills of health be numbered in a separate series.

In the fiscal year ending June 30, 1914, only seven bills of health were issued, but this series was continued after July 1, 1914, up to November 23, 1914, on which day it was discontinued by the advice of the American consul general, because on that day the American troops evacuated Vera Cruz. From July 1 to November 23, 1914,

37 bills of health were issued, which, added to the other 7, makes a total of 44 bills of health in this series.

In order to avoid confusion in the records the regular series numbers were continued, writing immediately under them "Vera Cruz, No. —."

SMALLPOX.

In November and December, 1914, and January, 1915, there were several cases of smallpox in Habana. The first case was of short duration, and died November 3. The patient had not been outside of Habana for several months. The source of infection was unknown and was never discovered. Presumably the disease was brought to Habana from Mexico by some one landing in the pre-eruptive stage and was thus able to pass unnoticed. The department of sanitation took active measures and the outbreak was suppressed. No cases were reported in the interior of the island.

TYPHOID FEVER AND WATER SUPPLY.

The water supply of Habana in former years was its boast; the purity of Vento water was proverbial. The pure Vento water is still pure, but as the city has grown considerably and the water supply became insufficient in quantity the supply has been increased by taking in "filtrations" from the Almendares River, which is very foul. Moreover, the "filtrations" are natural and insufficient. The result has been apparent in the number of cases of typhoid fever in this city; there are always 40 to 50 cases in Habana, where a few years ago the disease was almost unknown.

THE FERRYBOAT "HENRY M. FLAGLER," ITS WHARF AND ITS ENVIRONMENTS.

On January 8, 1915, the new steam ferryboat *Henry M. Flagler* left Habana for Key West for the first time. It was built for freight only, and intended to take its cargo in railroad cars. These were to be put in and out by the rear end. The vessel was made to fasten to the wharf by three strong bolts. A new wharf was built expressly for it, entirely of wood, but the connection with the shore was by means of a strong concrete wall. The location of this wharf was very convenient to the new railroad station, but otherwise in a very bad part of the bay, being between the San Jose wharves, which are old wooden structures, rat infested, and the city garbage dump, also rat infested.

The vessel itself was all of steel and structurally rat proof. The vessel arrived between 6 and 7 a. m., and usually left in about three hours. In this short time during the daylight there was so much movement at the only place where the rats might get on board that danger from this source was discounted. In view of this, with the approval of the bureau, this vessel was exempted from fumigation, inspections being made regularly to be sure that there were no rats on board.

The Peninsular & Occidental Steamship Co., to which this vessel belongs, having seen the convenience of having a wharf of its own, decided to extend it. Alongside of this wharf, toward the west, a

solid bulkhead of concrete piles has been extended for about a hundred yards; outside of this and parallel to it a reinforced-concrete wharf has been built. It is predicted that these extended improvements will cause this property to be indirectly developed into a source of danger from rats from slaughterhouses in the vicinity. Therefore special precautions may be inaugurated at any time by the medical officer relating to the prevention of the movement of rodents to this property.

PLAGUE IN HABANA.

The end of the fiscal year 1913-14 saw the end of the epidemic of bubonic plague in Habana for all practical purposes. On June 30, 1914, there remained four cases under treatment, all in frank convalescence and all discharged cured between July 5 and 18, 1914.

Not so, however, in Santiago de Cuba, where the first case was confirmed on June 29, 1914, and where there were 16 cases in the following three months.

As a detailed account of last year's epidemic was given in the last annual report and there is nothing of special interest to add about the above-mentioned four cases in Habana, only the cases of this year are taken up in this report.

On January 28, 1915, a rat suspicious of bubonic plague was found at O'Reilly 31, a restaurant. On February 6 the rat was declared infected. On disinfecting the house 40 rats were found, none of them infected.

On February 8, 1915, the first case of human plague was confirmed, and he died that day, having been sick two days.

On February 12 the second and third cases were confirmed. On March 24 and April 3 the fourth and fifth cases were confirmed, respectively.

These first five cases were all rapidly fatal. All lived distant from each other and outside of the old so-called infected zone of 1912 and 1914. This beginning was alarming, for it looked as if the disease had appeared in a very virulent form.

The sixth case was of interest, because it was in the center of the old infected district of 1912 and of 1914, and six weeks later case No. 16 was taken sick, only a few doors away. In spite of all precautions taken, this seems to remain a focus of infection.

This year cases developed all over town, even in Vedado and Cerro, two suburbs, and it was not always possible to trace the infection. There was no part of the town that could be called the infected district.

This year, like last year, cases developed out of town. Early in April two cases developed in Pinar del Rio city, and two cases developed in Guanabacoa in May and July. In these four cases the infection was traced to wholesale provision stores in Habana. The two cases from Guanabacoa were brought to Habana for treatment, the first one being taken to Las Animas and the second to La Benefica hospitals. However these four are not counted with the Habana cases.

From February 8, 1915, when the first human case of plague was confirmed, up to June 30, 1915, there were 17 cases of plague in Habana, of which 9 died, 7 were discharged cured, 1 remained under

treatment on June 30, 1915, convalescing. In addition to this the two cases brought from Guanabacoa were convalescing in Habana hospitals. All the cases were of the bubonic type.

The Cuban sanitary department has worked hard and earnestly to combat the disease. The measures taken are the same as last year. The committee on infectious diseases sees all suspicious cases and makes the diagnosis. All cases are confirmed bacteriologically, and, if necessary, inoculations are made before deciding the diagnosis. Deratization is carried out extensively, rats are autopsied and examined bacteriologically. Guinea pigs are placed in infected houses as control experiments; in some cases they have become infected. Infected premises are fumigated and disinfected; rat holes are injected with hydrocyanic-acid gas.

Only two infected rats have been found, the first on January 28, 1915, at O'Reilly 31, a restaurant; this was confirmed on February 6. The second rat was found at Dragones 76 on May 10; it was confirmed May 13.

The routine work of disinfection, etc., is the same as last year, and as that was gone into in detail in last year's annual report it will not be repeated here. The only change worth noting is the increased use of hydrocyanic-acid gas for fumigating. No deaths have been caused by it and it does no harm to merchandise like sulphur.

OUTGOING QUARANTINE ON ACCOUNT OF BUBONIC PLAGUE IN HABANA.

Measures.—(1) Vessels, whether at anchor in the open bay or tied to a wharf, must take all possible precautions to prevent the ingress of rats. These are, (a) use metallic rat guards on all lines going to the lighters or to the wharf, (b) if at a wharf the vessels must fend off 6 feet, and at night must remove all gangways and planks.

(2) Vessels will be allowed to tie to rat-proof wharves only.

(3) Any merchandise liable to harbor rats must be inspected and passed before it can be taken on board. In case the inspector refuses a permit to embark, the merchandise may be unpacked and repacked in his presence or fumigated, according to circumstances.

(4) No merchandise liable to harbor rats is accepted if it has passed the night on the wharf, even if it is a so-called rat-proof wharf.

(5) Loaded lighters waiting to be towed to a steamer must be separated from the wharf at least 25 yards.

(6) Vessels must be fumigated at least once a month.

(7) Vessels going to nonrat-proof wharves must be fumigated in the open bay before they begin to load for the United States, and if they return to a nonrat-proof wharf they will forfeit the fumigation.

(8) No restriction was placed on crews or passengers. These were allowed ashore freely day and night.

(9) Special regulations were made for the ferryboat *Henry M. Flagler* on account of the peculiarities it presented.

In order to enforce the regulations six inspectors were named who were distributed among the wharves, their stations being changed every week in rotation, so that each man would become familiar with all parts of the bay and of the city, for one of their duties was to

watch the markets and the packing houses of the fruit exporters. For each invoice of fruit or other merchandise liable to harbor rats an application in triplicate was presented for an embarkation permit. Each application covered only one lot for one steamer. When the inspector had satisfied himself of the truth of the statements made in this application he stamped it with a rubber stamp marked "Embarkation permitted," signed it, and dated it. The original was kept by the inspector for the office file. The duplicate was sent on board with the first lighter load to be taken up by the ship's officers and given to the medical officer who made the inspection before departure. The triplicate was kept by the shipper. In case more than one lighter was required to take an invoice each additional lighter had an additional permit, smaller and of another form, which was delivered to the ship's officers, and it was also taken up with the other permits.

PLAGUE IN SANTIAGO DE CUBA.

The beginning of this fiscal year saw the beginning of an epidemic of plague in Santiago de Cuba. The first case was confirmed June 29, 1914. The last case was taken sick September 13, but he was not discovered until September 16, and died the next day. The diagnosis was confirmed bacteriologically on September 22, 1914. In all there were 16 cases, all bubonic. Of the 16 cases 4 died. Most of these cases developed in the business part of the town, near the water front, and in the poorer part of the town to the north of this, also near the water front.

Four cases, one of them fatal, developed at a country store called El Aceite, 3 kilometers beyond Caney. Their provisions were bought in one of the infected wholesale stores in Santiago. The cases were taken to the civil hospital at Santiago.

HONGKONG, CHINA.

Passed Asst. Surg. Hugh de Valin reports as follows:

Bills of health were issued to 367 vessels carrying 7,070 cabin passengers, 14,015 steerage, and 33,976 crew.

Two hundred and eighty steerage passengers and 2,122 members of crew were bathed, and 2,528 pieces of baggage were disinfected. One hundred and twenty-seven vessels were fumigated with sulphur and 726 rats were killed; only 63 out of 127 fumigations were supervised by this office. The crews' quarters of 120 vessels were disinfected with formaldehyde gas, not under the supervision of this office, and 120 vessels were cleared without disinfection of any kind. The following list of cargo was either stored or disinfected:

	Disin- fected.	Stored.		Disin- fected.	Stored.
Human hair, cases.....		515	Bonemeal, bags.....		28,923
Bristles, cases.....		516	Old embroideries, pieces.....	21	
Hides, cases.....	13,651		Old rubber shoes, bags.....	112	
Feathers, bales.....		3			

The rats report from the colonial government give a total of 102,763 rats caught during the fiscal year, and of this number 98 were plague infected. The following communicable diseases were reported during the fiscal year:

	Cases.	Deaths.		Cases.	Deaths.
Bubonic plague.....	188	162	Paratyphoid fever.....	6	0
Enteric fever.....	121	46	Relapsing fever.....	4	1
Diphtheria.....	81	39	Cholera nostras.....	2	2
Smallpox.....	35	26	Asiatic cholera.....	2	1
Puerperal fever.....	11	8	Scarlet fever.....	1	1

LA GUAIRA, VENEZUELA.

Acting Asst. Surg. W. J. S. Stewart in charge:

The transactions of the office of the United States Public Health Service in this port during the fiscal year 1915 have been as follows:

Total number of vessels arriving and departing and inspected.....	127
Total passengers in transit.....	4, 890
Total passengers for Colon.....	124
Total for New York and Porto Rico.....	318
Total crews.....	11, 861
Total baggage inspected and labeled.....	560

The transactions of the latter half of the fiscal year—i. e., since January 1, 1915—show a larger movement of passengers than during the first half, for what reason it is difficult to say, as the war in Europe has had an opposite effect, if any, in the movement of passengers.

The health of the country viewed from the standpoint of quarantinable disease has been excellent. There has been no case of yellow fever in La Guira during the fiscal year, and only two cases in Caracas, one of which was an imported case from Valencia, and the other a resident of Caracas. The last case—which was the latter, the resident—occurred on the last day of 1914, and was a very mild case, with no other cases following it. There have been no cases of yellow fever in Puerto Cabello during that period either, and none in Ciudad Bolivar as far as information received would indicate, but this is not true of Maracaibo, which is always the place where yellow fever smolders along, and always has done so. It is considered by physicians living there that the disease is kept alive by the infection of very young children, amongst whom the disease seems to assume a very light form, but of course in this way the infection is kept alive, and every once in a while some foreigner comes there fresh from uninfected localities and is stricken with the disease. No cases of bubonic plague have occurred anywhere in the country during the year, nor have there been any suspicious cases of any disease resembling it.

During the year, however, Caracas was attacked by an epidemic of measles and whooping cough, sarampion, and tosferina, respectively, and these two diseases spread from that city to La Guayra and to all the towns connected with Caracas by rail, as no effort was made to isolate cases.

The death rate among children rose to an alarming extent, the funerals of young children in Caracas, at one time, the height of the disease—about January, 1915—rising to the unprecedented number of 10 to 12 per day. The total death rate of the city during this outbreak was tripled for a while, the deaths being caused in most cases by pneumonia following either disease and in some cases rapid death from the overwhelming infection in the case of measles. The severity declined from month to month and at the close of the fiscal year things have regained the normal in this particular.

The only other visitation of disease of this character was an outbreak of variola in the State of Tachira, in the southwestern part of the Republic. All persons arriving in Maracaibo from that State were offered free vaccination by the central office in Caracas, which in this case provided free virus and vaccinators. Very little advantage of this offer was taken, however, and after lasting for some six months it was discontinued for want of material.

Vaccination of school children is not a requirement in Venezuela, and although the disease is not endemic in the country, when it does occur from introduction it has a very severe course. The last great outbreak of variola in Venezuela was some 10 years ago in the city of Valencia, where the city was decimated. Vaccination is not generally practiced in the country.

The board commissioned to look into the status of hookworm visited almost all the outlying towns near Caracas, including La Guayra and Maquinitia, and examined and treated gratis all persons who applied for treatment, the visit of the commission being advertised for several days beforehand.

After treatment was given and a record of cases taken, a second visit was made by the commission in about three weeks' time, and as far as possible the same cases were seen again and a second record taken of their condition; but the funds for this work were in a little while exhausted and the work discontinued. During the past year—indeed, in the last six months—there has been an inspector from the Rockefeller Foundation in Caracas obtaining all information possible in regard to the spread of hookworm in this country.

Dysentery and typhoid fever still claim far too many deaths in Caracas—not so in La Guayra or in Puerto Cabello; but in Caracas the water supply is of very mixed quality and is undoubtedly infected, as has been proved.

Rat catching is still being carried on in Caracas, and during the year preceding last December the total catch was a trifle over 15,000, with no discovery of infection. No examination of rats is made in La Guayra, and none has been made for a year past.

The Oficina de Sanidad Nacional has, however, in the past year done considerable good work in La Guayra, and also in Puerto Cabello and Caracas, in the way of rat proofing old buildings and requiring that all new buildings be of rat-proof construction. The warehouses in this port have been much improved in the past year, and so have many of the older buildings in the town. Few new buildings are ever constructed here, and the old method of stores and warehouses combined, with the dirt floors, the office portion of which would be covered with wooden flooring, made ideal places for rodents

of any kind. These have all been done away with and new cement floors constructed. The piers in this port at which steamers lie are in good condition, but at one time they were used as a storage place for beams and timbers.

SHANGHAI, CHINA.

Acting Asst. Surg. S. A. Ransom reports as follows:

Transactions.

Steamers inspected and passed	149
Steamers disinfected	15
Number of crew on steamers	20, 942
Number of passengers on steamers	13, 115
Number of bills of health issued	166
Number of persons bathed	252
Number of pieces of baggage disinfected	252
Number of pieces of freight viséed	867, 907
Freight disinfected and certified	27, 470
Vaccination certificates	593

There were investigated during the period under consideration five cases of illness occurring on vessels requiring bills of health from this port to American or Philippine ports, two of which, on the *Saratoga*, proved to be smallpox. The patients were removed to the hospital in the preeruptive stage, the entire personnel exposed was vaccinated, their effects disinfected, and the vessel fumigated and quarantined for the incubation period, with the satisfactory result of no subsequent cases.

The inspection, from time to time, of cargo destined to the United States has continued and certificates were issued to show disinfection or special preparation of certain cargo. This includes particularly bristles, hair (human and animal), hides (green and dry), second-hand personal effects, household goods, etc. Certificates signed by the American consul on the spot are required for this class of cargo from outports and the interior of China for United States of America via Shanghai, which certificates must be presented to the service officer before the cargo is passed for loading. It is the rule here that no vessel will receive cargo unless the "shipping order" or boat note for same has been passed and countersigned. These are compared with the cargo manifest, which is presented for signature with other papers upon the sailing of the vessel; hence, there is a very close check kept on all cargo forwarded.

Handlers of this class of cargo state that there is considerable danger of anthrax being conveyed in wool, and that cases occur under their personal observation. No provision is made, however, for the disinfection of wool. A class of cargo which threatens to seek entry into the United States of America for paper manufacture is dirty cotton wadding (used in Chinese garments and bedding) sorted from among Chinese rags. This is the filthiest cargo imaginable, and if offered for shipment will, of course, be required to undergo steam disinfection before being passed.

Among the precautions adopted by this office to protect ships and cargo from becoming infested with rats are the following:

All vessels loading for United States of America are required to anchor in stream, and rat guards are required to be used on all lines attaching cargo boats and other craft to such steamers.

Fumigation is required of all vessels empty here, and of those not holding a fumigation certificate dated within six months signed by an American official. Sulphur is the agent usually employed, in the strength provided for in the quarantine regulation, but carbon dioxide has been used with gratifying results as to number of rats found dead on one or two occasions where some cargo from a previous port was already in the ship.

Loading is done as far as practicable by daylight.

All lighters conveying cargo to ships for the United States of America are fumigated with sulphur periodically, under supervision. During the year just closed 385 such lighters were treated, which resulted in obtaining 348 dead rats, a considerable increase over last year's work.

Vessels and personnel departing for American or Philippine ports are inspected and bill of health issued as nearly as possible to hour of sailing.

The health of the settlement shows some improvement in the matter of minor contagious diseases. Smallpox, however, showed among foreigners 59 cases, as compared with 36; among natives 182 deaths, as compared with 91 in 1914. In 1914 there was 1 death among natives from plague, while during the year just closed there were 16 deaths from plague among natives. Eleven of these occurred in October and November. There seems no special reason assignable for this outbreak. There was a coincident increase in rat plague during this period and for the month preceding and following.

Rat plague was present throughout the year, 184 infected animals being found, an incidence of nearly 1 per cent of the rats examined.

Leprosy and typhus fever appear sporadically, and there are from time to time small circumscribed epidemics of relapsing fever. Diarrheal diseases are always present. Beriberi is also frequently seen among the natives. Rabies is seen occasionally in human beings. Among animals, rabies in dogs, rinderpest, foot-and-mouth disease, anthrax, etc., are encountered.

The water supply of Shanghai is obtained from the Whangpoo River, and is passed through filter beds of sand and rock before distribution to consumers, which process removes about 95 to 97 per cent of the bacteria present.

The plant for treating this water supply was erected many years ago before this settlement had attained its present dimensions, so that now it is in a densely populated district. It is situated below the main part of the city. It was originally intended that the supply of water for filtration should be pumped on the beds at high tide, this giving in theory at least a supply of clean Yangtze water. The demand is now so heavy, however, that water is pumped for a much greater period than at high tide. Some users of this water seem to escape harm from drinking the raw water, but the vast majority boil it before use.

NAPLES, ITALY.

Surg. J. M. Eager reports as follows for the fiscal year ending June 30, 1915:

Statistics of the service at Naples, Italy.

Months.	Ships.	Emigrants.		Baggage.	
		In-spected.	Em-barked.	In-spected.	Disin-fected.
1914.					
July.....	28	3,104	3,006	2,453	3,753
August.....	23	1,974	1,911	1,219	2,965
September.....	22	1,833	1,771	1,368	1,938
October.....	27	2,756	2,670	1,994	2,340
November.....	25	2,917	2,832	2,184	2,655
December.....	22	1,266	1,239	781	986
1915.					
January.....	24	1,553	1,526	1,135	1,450
February.....	31	2,299	2,257	1,580	1,738
March.....	30	2,835	2,794	1,755	1,869
April.....	29	4,117	4,032	2,140	2,535
May.....	38	2,861	2,811	2,075	2,265
June.....	36	1,111	1,105	967	897
Total.....	335	28,626	27,954	19,651	25,391

Rejections recommended.

Months.	Trachoma.	Favus.	Sus-pected trachoma.	Other causes.	Total.
1914.					
July.....	45	4	29	20	98
August.....	49	1	6	7	63
September.....	45	1	10	6	62
October.....	57	5	11	13	86
November.....	53	4	15	13	85
December.....	19	2	4	2	27
1915.					
January.....	21	.....	2	4	27
February.....	32	1	5	4	42
March.....	25	5	3	8	41
April.....	49	4	7	25	85
May.....	33	5	3	9	50
June.....	2	2	.....	2	6
Total.....	430	34	95	113	672

Comparison with last two years.

Year.	Emigrants.		Baggage.		Rejec-tions recom-mended.
	In-spected.	Em-barked.	Disin-fected.	Passed.	
1912-13.....	178,407	168,189	224,550	23,480	10,218
1913-14.....	168,743	162,827	192,081	43,044	5,916
1914-15.....	28,626	27,954	25,391	19,651	672

Statistics of the service at Messina, Italy.

Months.	Ships.	Emigrants.		Baggage.	
		In-spected.	Em-barked.	In-spected.	Disin-fected.
1914.					
July.....	2	92	80	25	136
September.....	1	6	6	.....	10
October.....	1				
November.....	1	39	34	20	78
December.....	1				
1915.					
January.....	1	43	39	25	46
February.....	1				
March.....	1				
April.....	1				
Total.....	10	180	159	70	270

Rejections recommended.

Months.	Tra-choma.	Favus.	Other causes.	Total.
1914.				
July.....	9	1	2	12
November.....	4		1	5
1915.				
January.....	3		1	4
Total.....	16	1	4	21

TYPHUS FEVER AND CHOLERA IN THE LEVANT AND WAR ZONE.

As in former years, all vessels leaving Naples for United States ports have been granted bills of health. As a preliminary, all steerage passengers have been inspected and vaccinated, and, when deemed necessary, their effects have been disinfected. Especial vigilance has been exercised against infection from cholera in the Levant and in the European war zone, and against typhus. With the cooperation of the Italian Government, all persons suspected of being exposed to these infections and contemplating departure for the United States have been detained in a detention house at Naples, all precautions prescribed by the United States quarantine regulations being conformed with, including fecal examination for the detection of cholera carriers, and rigorous measures against lice in the case of persons who might convey typhus.

During the fiscal year 623 persons were detained at the detention house because of being under suspicion as capable of conveying cholera, and 347 of these persons were also under suspicion as regards typhus.

MEXICAN PORTS.

FRONTERA, MEXICO.

Acting Asst. Surg. C. K. Roe reports as follows:

During the period between April 6 and June 30, 1915, 44 vessels were inspected, 27 of which were fumigated. This involved the inspection of 1,036 crew and 9 passengers.

PROGRESO, MEXICO.

Acting Asst. Surg. H. E. Gimler reports as follows:

Sixty-three vessels were inspected and passed after fumigation for the destruction of mosquitoes. These vessels carried 2,341 crew and 1,141 passengers.

TAMPICO, MEXICO.

Acting Asst. Surg. G. McG. Stewart reports as follows:

During the period between April 6, 1915, and the close of the fiscal year 135 vessels were inspected and 62 fumigated. There were no cases of yellow fever reported.

TUXPAM, MEXICO.

Acting Asst. Surg. L. M. Taylor reports as follows:

Tuxpam Bar, located midway between Vera Cruz and Tampico, at the mouth of Tuxpam River, is the shipping point of the Aguila and Penn Mex oil companies; no other traffic enters or leaves the port.

Health conditions are good, and are guarded by the companies interested; no quarantinable diseases exist locally, though variola is prevalent at the town of Tuxpam, 10 miles up the river. Malaria and a mild form of dysentery are the principal disorders amongst a population of 1,000. Every effort is being made to improve sanitation and prevent mosquito propagation—water tanks covered, land-crab holes filled, a dense coconut grove thinned out, all ditches drained, extensive filling of swamps, grass and weeds cut each week, day and night guard at the launch wharves to prevent entrance of suspicious cases from above and also to prevent communication with vessels loading outside for southern United States ports.

The medical officer in charge has been located at the station nine months, and his duties consist of fumigating the superstructures of oil tank steamers and the inspection of their crews, there being no passenger vessels out to United States ports. During this period 86 tankers have been disinfected, and though there is no suspicion of yellow fever in the district, it is the policy of those interested to maintain fumigation all the year.

Vessels are loaded 1 mile from shore through pipe lines, and, owing to the rough sea on the bar, are accessible only by surf boats belonging to the companies, thereby establishing an absolute quarantine over all tankers destined for Gulf ports. No difficulties have been encountered in carrying out the bureau regulations; on the contrary, every assistance is given and immediate action taken on suggestions advanced to raise the health standard. The most friendly relations exist between the Mexican health authorities of Tuxpam and the local bureau officer, he having been repeatedly requested to represent the former.

VERA CRUZ, MEXICO.

Acting Asst. Surg. I. A. Campbell reports as follows:

During the period between April 6, 1915, and June 30, 1915, 33 vessels were inspected and 7 fumigated. There were also 2,918 passengers and crews inspected.

SALINA CRUZ, MEXICO.

Acting Asst. Surg. A. E. Gochicoa reports as follows:

There has been little movement of shipping, either local or foreign; only the Japanese steamers of the Toyo Kisen Kaisha, plying between Salina Cruz and Honolulu, have been fumigated. The other steamers clearing for the United States or possessions were those of the Pacific Mail Line and of the Salvador Railway Co. Steamship Service, and they did not require fumigation. In spite of the considerable movement of troops through Salina Cruz from different parts of Mexico, the general health of the population has been good. Notwithstanding the political situation in the country, the sanitary work of the superior board of health has progressed as usual, and the campaign for the prevention of yellow fever and other diseases has been carried out continuously, as in the past, and no diseases have appeared in epidemic form, as can be seen by the following statement:

Diseases.	Cases.	Deaths.	Remarks.
Cerebrospinal meningitis.....	None.	None.	Unknown.
Cholera (Asiatic).....	None.	None.	Do.
Diphtheria.....	None.	None.	Do.
Measles.....	None.	15	All children.
Plague.....	None.	None.	Unknown.
Poliomyelitis (acute ant.).....	None.	None.	Do.
Scarlet fever.....	None.	None.	Do.
Smallpox.....	19	6	4 black form; all died.
Typhoid fever.....	None.	9	Endemic.
Typhus fever.....	None.	None.	Unknown.
Yellow fever.....	None.	None.	Disappeared since 1905.

Nearly all the cases of smallpox have become infected outside of Salina Cruz, but they were promptly detected by the sanitary inspectors and immediately transferred to the Lazaretto and the houses and effects of the persons disinfected; at the same time the neighbors were vaccinated or revaccinated. There is also a weekly service of vaccination for the general public. There has never appeared a new case of the disease in a house previously disinfected. This seems to prove that the disinfection has been effective.

Mortality.—During the fiscal year the total number of deaths from all causes was 267, the population being 5,174.

[illegible]

MEDICAL INSPECTION OF IMMIGRANTS.

During the fiscal year ended June 30, 1915, 562,263 immigrants were examined by the Public Health Service to determine their admissibility to the United States and its dependencies under the immigration laws. Of this number, 17,840 were certified on account of either mental or physical unfitness. During the fiscal year ended June 30, 1914, 1,485,957 immigrants were examined, of which number 41,250 were certified for physical reasons, showing a decrease for the fiscal year 1915 of 923,694 immigrants and 23,410 certificates issued for mental or physical defects.

This important work has necessitated the assignment of 82 medical officers, whose duty has been confined exclusively to the mental and physical examination of immigrants; but, in addition to this, nearly every officer in the Public Health Service performs more or less work every year in this connection.

The Public Health Service officers stationed in the American consulates in foreign ports have carried on their work of inspecting intending immigrants in connection with the quarantine inspection of steerage passengers destined to United States ports. It should be understood, however, that medical officers stationed in foreign ports do not reject aliens, even if found suffering from any of the mental or physical diseases deportable under the immigration laws of the United States. They merely notify the proper authorities in the foreign ports that such immigrants are liable to deportation upon their arrival at United States ports.

The past year has marked the usual improvement in the methods of examining immigrants upon their arrival. Studies with a view of ascertaining the most reliable methods of determining mental deviation in aliens have been pursued, and in connection with this work a board of medical officers at the Ellis Island immigration station has been engaged in preparing a manual for the examination of aliens to detect mental diseases, which will be published in the near future.

The officers in the bacteriological laboratory at the Ellis Island immigration station have been making studies regarding trachoma, and have otherwise rendered much aid of a diagnostic and therapeutic character to the two immigrant hospitals.

It has been necessary to reduce the medical staff at Ellis Island on account of the diminution of immigration since the outbreak of the European war, the result being that the medical staff has been relatively larger during this time than before. From this state of affairs two conditions have been noticed which would indicate an increase in the efficiency of the inspection of aliens at that station. Before mentioning these conditions a word may be said as to the general method of inspecting aliens at all immigration stations, which is as follows:

The immigrants are caused to pass slowly in single file along the inspection line. While the line is passing each alien is carefully

looked at by two medical officers at the rate of 1 to every 20 seconds, which is equivalent to saying that an alien is inspected by one medical officer for 40 seconds. In the course of this observation those who show any evidence of mental or physical disease or defect, or those who excite suspicion that they are so affected, are turned aside for further examination. The number usually turned aside under normal conditions at the large stations, notably Ellis Island, varies from 15 to 20 per cent. The persons thus turned aside are given a careful physical examination, or are examined as to their mental condition, as may be required in each case. Before the European war—that is, during the fiscal year ended June 30, 1914—1,009,854 aliens entered the port of New York, of which number 23,216, or 2.29 per cent, were certified for mental or physical disabilities of various kinds.

The first of the conditions mentioned above as having been observed as a result of the relatively larger size of the medical staff at Ellis Island since the beginning of the European war is that the percentage of certificates which have been given has risen from 2.29 to 5.37 per cent.

Second, on those days when the number of arriving aliens has been sufficiently small to make it possible to turn all of the steerage immigrants into the examination rooms and give them all a careful examination, the number of certificates increased to 9.37 per cent; or, to repeat these facts concisely—

A. By affording an increased time for the routine inspection the medical certificates at Ellis Island were shown to increase from 2.29 to 5.37 per cent.

B. By subjecting all aliens to a careful physical examination the number of certificates increased to 9.37 per cent.

These observations bring up the question as to what the result would be if there were a sufficient number of medical officers at all immigration stations to give to all arriving aliens a careful physical examination. It is thought that an increase might be expected in the class of diseases known as "loathsome, contagious diseases." It is also thought that venereal diseases would be disclosed in a much larger proportion of cases than is possible at the present time. Then, too, it is thought that conditions could be found in a number of arriving aliens which, while not diseases or defects deportable under the immigration laws, or even, for that matter, directly affecting the public health, might prove to be disabling disorders which would not only severely handicap them in the struggle for existence in this country but would sooner or later make them public charges upon States or municipalities.

A review of the immigration work performed during the past fiscal year by the Public Health Service tends to the belief that a demand has already been created for a more rigid inspection of arriving aliens to determine their exact mental or physical status. It is also believed that the necessity for increased efficiency along these lines will not lessen with the end of hostilities in Europe, at which time students of the subject predict that even if the tide of immigration does not markedly increase, the percentage of mental and physical defectives will be much larger than ever, for the reason that in the scheme of reconstructing the countries at war the main object will be to dispose of, through the avenues of emigration, those persons who will be least useful at home.

BOSTON, MASS.

The regular work of the medical officers of the service attached to the immigration station at Boston is to be considered under seven separate headings, to wit:

(1) The boarding of ships and primary inspection of passengers or members of the crew.

(2) The medical examinations, physical and mental, of aliens detained on primary inspection.

(3) Surveillance over the cases of aliens placed in various hospitals for purposes of treatment or examination.

(4) The medical treatment of aliens kept under treatment at the immigration detention station itself.

(5) Medical surveillance over all inmates of the immigration station and the sanitary care of the station.

(6) General office work.

(7) The investigation of alien public charge cases to supply the Secretary of Labor with the medical information necessary for appropriate action in regard to such cases.

In addition to the foregoing the officers of the service attached to the Boston Immigration Station have, during the year, been utilized for work entirely apart from matters relating to immigration. As for a number of years past, they have acted as medical advisers to the United States Civil Service Commission for the New England district, and during the year have made, in various places in this territory, several hundred physical examinations of candidates for appointment in the United States classified civil service, for whose examination the Government makes no other provision. During the year the medical officers have also delivered courses of lectures on medical examinations at the Harvard-Technology School for Health Officers, on ship sanitation and maritime quarantine at the Massachusetts State Nautical Training School; on three occasions they have served as members of service boards away from their station; they have instructed acting assistant surgeons at Yarmouth, Nova Scotia, and at New Bedford, Mass., in the performance of their duties; one of the medical officers has been detailed for temporary duty at the marine hospital at Chelsea, and another, at the request of the Massachusetts State Board of Labor and Industries, has, since January, been connected with that board in making certain industrial hygiene investigations in the State.

1. BOARDING OF SHIPS AND THE PRIMARY INSPECTION OF PASSENGERS AND MEMBERS OF THE CREWS.

During the year 1,368 vessels arrived at Boston from foreign ports. The number of such vessels which proved on arrival to have passengers or crews requiring inspection for the purposes of the immigration laws was 258. Because the usual advance information as to ships leaving foreign ports with passengers and wireless advices as to time of arrival were not available or dependable, owing to conditions caused by the war, it was practically necessary to have the customs boarding boat continually covered by at least one medical officer from 7 a.m. until boarding was discontinued at night. The inspection of cabin passengers and such portions of crews as the medical

officers were called on to examine was made as usual on shipboard. As a rule the inspection of the steerage was also made as formerly on shore at some one of the four docks about the harbor fitted up for this purpose, but instances in which, for one reason or another, it was necessary to make the inspection of steerage passengers as well as cabin passengers on shipboard were more numerous than in previous years.

2. THE MEDICAL EXAMINATION OF ALIENS DETAINED ON PRIMARY INSPECTION.

From data steadily being accumulated, both by State and Federal officials, it is evident that the requirements of the Federal statutes with respect to the medical examination of arriving aliens can not be fulfilled by an examination process which fails to include and to utilize to the fullest extent up-to-date diagnostic knowledge for the detection both of physical disease and of mental defectiveness. During the past fiscal year there were thrown back on the Boston immigration office by State officials of the New England States alone 334 alien residents of these States who had become public charges on account of physical or mental conditions, alleged to have antedated their arrival in the country. These cases comprised 137 insane, 23 otherwise mentally defective, 8 afflicted with diseases classified as "loathsome" or "dangerous contagious," 37 with tuberculosis, and 129 suffering from various other disabilities. In 326 of these cases the evidence as to the existence of the conditions prior to arrival in the country was deemed by the Secretary of Labor sufficient to justify the issuance of departmental warrants of arrest.

During the past fiscal year the officers on immigration duty at Boston have endeavored to utilize the opportunity offered by lessened immigration to see what might be accomplished by a more systematic study of individual aliens who can easily be recognized as in some way abnormal by officers sufficiently experienced in the ordinary immigration-inspection process to know normal types of immigrants of different nationalities and to recognize the abnormal. There have been certified at Boston the past year more cases of insanity or mental defectiveness and more cases of serious diseases whose diagnosis was dependent upon laboratory examinations than during the previous year, when the alien passenger arrivals at the port were over three and a half times as many. One second-cabin alien passenger in every 10 received a medical certificate, as compared with 1 in 14 for the previous year, and 1 steerage alien in every 14 received a medical certificate, as compared with 1 in 23 for the preceding year.

Out of 559 aliens held for further study after being subjected to such an examination as ordinarily would have been deemed sufficient a few years ago to fulfill the requirements of the law, 332, or considerably over one-half, eventually received medical certificates, and 193 for conditions sufficiently serious as practically to call for exclusion by boards of special inquiry.

The laboratory work of the year has shown that among certain classes of aliens hookworm infection is common. Among others infection with other intestinal parasites, including tapeworms, is so prevalent as to be deserving of serious attention from both economic and public health points of view. The laboratory work of the year has shown that aliens suffering with forms of leishmaniasis have arrived

at New Bedford, Mass., from the Cape Verde Islands, that foci of infection of relapsing fever probably exist in the country at the present time, and that positive Wassermann reactions may be obtained from an appreciable proportion of immigrants who present no discoverable clinical signs of syphilitic infection, sometimes temporarily and in some instances repeatedly in cases in which the significance of such a reaction seems open to considerable doubt. For the results obtained during the year from a more systematic study of abnormal types of immigrants, the service is indebted to the medical staffs of all the hospitals in the vicinity of Boston to which such immigrants have been sent, but the assistance rendered by Dr. Jose P. Bill, by his intelligent and painstaking work at the laboratory of the Carney Hospital, is especially deserving of mention.

3. SURVEILLANCE OVER THE TREATMENT AND EXAMINATION OF ALIENS IN HOSPITALS.

Nine hospitals in Boston and its vicinity have been resorted to during the year for the purposes of the treatment or examination of arriving aliens. The selection of the hospital in any particular case has been determined by the limitations set by certain hospitals on the number and class of immigrant cases the hospital is willing to receive and by the policy of the Boston immigration office to see that a sick immigrant shall have advantage of the best facilities for the treatment of his particular case that any institution in the vicinity of Boston may afford. As a visit to the nearest of these hospitals requires at least an hour and a half, and as the farthest is 30 miles from the immigration station, it has been a serious tax upon the time of the medical officers of the service to watch the hospital cases for the purposes of examination and treatment and to prevent unnecessary charges for hospital maintenance against the transportation companies or the immigration appropriation.

The total number of aliens sent to hospitals during the year was about four-fifths the number for the previous year, but the average period of detention in hospital was considerably longer. Also, for the reasons mentioned below, it was necessary during the past year practically to maintain a hospital at the immigration detention station itself, and many cases were kept and treated there which in previous years would have been transferred elsewhere.

4. MEDICAL TREATMENT OF ALIENS AT THE IMMIGRATION STATION.

With the outbreak of the European war there began to accumulate at the immigration detention station arriving aliens who were being excluded from admission for different reasons, including chronic diseases, and whose deportation could not be effected. There were continually coming to the Boston immigration station in this way not merely aliens arriving at Boston but at other ports as well, because all aliens remaining detained after the primary immigration examination at Providence and New Bedford, and to some extent those arriving at Portland as well, are brought to the Boston immigration station, where all subsequent transactions, medical or otherwise, with reference to them are handled. In some of these cases actually requiring medical treatment, transfer to hospitals was impracticable because of doubts which arose as to ability to assure the

payment of hospital charges. Included among them also were many cases of contagious diseases, like active trachoma, whose treatment in hospital without special departmental authority is forbidden by law, but which had to be given medical attention as a matter of common decency and for the protection of other inmates of the station. Besides excluded arriving aliens there has accumulated at the immigration station since the beginning of the war landed aliens found to be unlawfully in the country by reason both of disease or criminal records and whose deportation has likewise been impracticable or impossible. Included among those thus detained for protracted periods at the immigration station have been many young babies, whose lives have depended upon proper artificial feeding. For the reasons above stated, it was therefore found necessary early in the year for the medical officers to assume the task of regularly providing hospital and dispensary treatment for persons at the immigration station, without available space to make suitable provision for the purpose and without assistance in duties usually performed in a hospital by nurses or attendants. The number of persons for whom it has been found necessary to provide such care has varied considerably, but has usually been sufficient to require the time of one medical officer and often of two for the greater part of every forenoon.

5. MEDICAL SURVEILLANCE AND SANITARY CARE OF THE STATION.

While exception may be taken to a flat statement that the Boston immigration detention station is unfit for human habitation, it is certainly unfit for the housing of the number of human beings that have been kept there during the past year for the length of time it has often been necessary to keep them. The interior partitions of the station are double walls of matched boards. The side walls and ceilings are likewise of matched boards. This woodwork is now hopelessly infested with bedbugs, which come out to forage on the inmates of the dormitories at night. The male dormitory has a sleeping capacity of 204 beds, and the female of 120. When fully occupied there is in the male dormitory an initial air space of about 100 cubic feet per head and in the female about 80 cubic feet. While a fair degree of ventilation is theoretically possible, it is practically unobtainable because of objections on the part of the inmates to the drafts that are produced. New installments of bedbugs and lice are brought into the station with every arriving ship, and immigrants who may be free from vermin when they arrive at the station are likely to soon become infested from their associates there. Many of the aliens brought to the station during the past year have had to remain there for months. The number of persons kept at the station has seldom fallen much below a hundred during the year, and at times the number has approached 300, and once at least has exceeded the bed capacity. Among those detained at the detention station for protracted periods during the year have been individuals of all types of moral degeneracy and persons afflicted with diseases classified by the service as both loathsome and dangerous contagious diseases, cases which in previous years it has not been customary to allow to be brought to the detention station at all.

It is regarded as one of the duties of the medical officers attached to the immigration station at Boston to preserve the health of such an assemblage of individuals under the conditions described. The methods in general by which it has been endeavored to accomplish this object are as follows: The preservation of mechanical cleanliness with respect to floors, beds, bedding, and other furnishings. A careful medical inspection every morning of every inmate of the detention station, including the taking of the temperature by a clinical thermometer of every child under 11 years of age. An arrangement whereby there is immediately reported to a medical officer any disposition on the part of any inmate to lie about on the benches or to refuse food at meals. The immediate isolation of any inmate of the station showing indications of sickness the cause of which is not clearly apparent.

During the year cases of tonsilitis among the inmates of the station, apparently due to streptococcus infection, have been very frequent and troublesome. Serious infection of slight wounds both among detained aliens and employees has been common. There has been one outbreak of diphtheria, which was promptly suppressed. On two occasions cases of smallpox have developed in the station, the disease in both instances being due to infection on shipboard. No secondary cases occurred among the inmates of the station.

In effort to better the sanitary condition of the station, Commissioner of Immigration Skeffington has secured authority to put at the station a steam and formaldehyde disinfecting plant with a 42 by 48 by 96 inch steam disinfecter. The apparatus will be in operation early the coming fiscal year. In effort to provide air and out-of-door exercise for the detained aliens during the hot weather, some of whom have been confined in the detention quarters for 10 months, Commissioner Skeffington is endeavoring to arrange to have them sent for daily outings as often as practicable to Gallops Island, where the Federal quarantine station is located.

6. GENERAL OFFICE WORK.

This work includes the issuance of medical certificates (in triplicate) on shipboard, at the docks, or at the station, requests for admission to hospital (in triplicate), notices to transportation companies (in triplicate) of the transfer of passengers to hospitals, the keeping of all records relating to certificate or hospital cases, the checking of all hospital bills, the preparation of all proposals and contracts for equipment and supplies furnished through the Immigration Service for the conduct of the medical work of the station, the keeping of all accounts relative thereto, the preparation of all requisitions, reports, and the compilation of all statistical data called for by the Public Health Bureau, and all correspondence relating to the immigration work or other official duties of the medical officers.

It is the policy of the chief medical officer at Boston to look after and keep in his own hands many matters relating to the medical work which at other immigration stations have either never been assumed by the medical officers or have been taken out of their hands. It is a regular routine practice of the immigration commissioner's office at Boston to refer to the chief medical officer for comment or sugges-

tion every matter which may be thought of interest to him, even though it may be only indirectly connected with the medical work. The regular daily routine work of the medical office also includes the presence of a medical officer before the boards of special inquiry whenever requested, to give oral information regarding the medical aspect of cases under consideration and the preparation of written reports on such cases whenever called for by boards of special inquiry, the Bureau of Immigration, the Secretary of Labor, or the courts, whether such cases may have arrived at Boston or be brought to the Boston station from Providence, New Bedford, or Portland, or be taken into custody on departmental warrants of arrest.

During the year, as in the past at this port, even the detention of an alien for the purpose of completing his medical examination has meant the appearance in the case not only of interested relatives and friends and a lawyer, but frequently of a Congressman as well. The litigation in the Federal courts over the exclusion of aliens at this port has also continued during the year, and there are now pending before the United States circuit court three cases in which, if the district court be sustained, officers of the Public Health Service will be reduced to the status of medical witnesses before immigration boards of special inquiry and their certificates or oral statements be considered in connection with the testimony of other medical witnesses produced by aliens' attorneys.

Through a readjustment of leases for the new fiscal year the commissioner of immigration has made an arrangement which will provide the medical officers the coming year with new quarters, offering better facilities not only for the transaction of regular office work but for laboratory and mental examinations as well.

7. THE INVESTIGATION OF ALIEN PUBLIC CHARGE CASES.

Sections 20 and 21 of the immigration law provide that if the Secretary of Labor "shall be satisfied" that an alien has become a public charge in the country within three years of arrival from causes antedating arrival or has entered the country in violation of law he shall be deported. So far as the New England States are concerned these provisions of law have practically come to mean that if an alien be alleged to have entered the country with an excludable disease or mental condition which escaped detection on arrival, or is a public charge from some disease or mental condition the causes of which existed prior to arrival, it is a duty of the medical officers at the Boston immigration station to see that the evidence submitted is sufficient to satisfy the Secretary whether or not the case be a deportable one and make a personal investigation in the locality where the alien may be if satisfactory information can not be otherwise secured. It is a part of the daily office work of the medical officers to pass upon the sufficiency of the medical evidence as to prior or subsequent causes presented to the commissioner of immigration in the cases of diseased aliens reported to the Boston immigration office by State or municipal officials with view to transferring the burden of maintenance of such aliens to the Federal Government. Including the cases in which the liability of the Federal Government was not regarded as established, there were about 700 alien public charges brought to the attention of the commissioner of immigration at Boston during the year.

A few years ago the medical officers at Boston were constantly obliged to travel about to make personal investigations of such cases, but as the result of the cooperation of State officials and the immigration inspectors, who invariably investigate every such case, it is now seldom necessary for a medical officer to travel to examine personally a case of this character except in the State of Connecticut. This State was recently transferred from the jurisdiction of the New York immigration office to the Boston immigration office, and the relations of Connecticut officials with the Federal immigration authorities are in an unsatisfactory condition and are continuing so because the medical officers at Boston have not yet found the time to put into operation working agreements with Connecticut officials as they have done with officials in other New England States.

During the past year Mr. Henry J. Skeffington has succeeded Col. George B. Billings as commissioner of immigration at Boston for the New England district, and the service is indebted to Commissioner Skeffington, Deputy Commissioner Hurley, and their subordinates for a continuation of the same intelligent cooperation and assistance in the work of the medical officers as has always characterized the Boston immigration office in the past. In this same connection also the chief medical officer calls attention to the faithful and efficient services which have been rendered by Acting Asst. Surgs. A. J. Nute and Hugo B. C. Riemer and Clerk John L. O'Neil.

There is appended hereto a description of certain features of the mental examination work at the station during the year and which has been prepared by Acting Asst. Surg. Nute at the request of the chief medical officer:

Section 2 of the immigration law of 1907, among other things, added feeble-minded persons to be excluded from admission into the United States. Beyond this the law did not take upon itself to define this condition, but apparently implied that the condition was well defined and commonly understood. With the idiot and imbecile this may be a true state of affairs. With the question of feeble-minded, however, the ways begin to diverge and the situation is markedly different. Tests have been worked out by psychologists which show satisfactory standards for certain classes or nationalities, as the French and American; but these are often inconclusive when applied to other races, or even to the French and American brought up under different mental, moral, and physical influences. A universal standard for normals is looked forward to as a result of the work now being carried on at Ellis Island.

During the past year the Boston Psychopathic Hospital has been investigating a point scale system of testing suspected defectives with a hope of devising a method applicable to all races. The idea has been to pick from the recognized standard tests, as the Huey, Goddard, Binet, Healy, and Knox systems, such features as will help to indicate mental capacity rather than mental age. The Yerkes-Bridges scale was devised as an aid to the determination of mental capacity and to be used as a preliminary test, followed by more comprehensive detailed tests, as the Healy, Goddard, and Knox scales, etc., to compare capacity of the individual with mental age. In order to standardize this Yerkes-Bridges test scale the normal credit range was based on the examination of about 800 school children in the city of Cambridge, Mass., and in addition the routine procedure on suspected defectives in the out-patient department of the Psychopathic Hospital. Also comparisons were made in the cases of illiterates with the Knox scale.

At this port the Yerkes-Bridges point scale was used in the examination of arriving aliens and, in the doubtful cases of Italians, De Sanctis tests were added before final conclusions were drawn.

While this point scale has been an advance over previous tests, they still have to be used with great care in estimating the moron among the illiterate aliens from districts in which living conditions are so primitive as not to be

generally appreciated. If an unanimous definition, accepted legally, as to what constituted a moron was placed in the statutes, and a mathematical standard or normal power, plus comprehension, plus memory, plus constructive imagination, were established, the problem would be easy. However, biology can not yet be measured with mathematical accuracy, and only a medical officer with long training and experience in immigration work can be expected to judge the abnormal. This credit scale of Prof. Yerkes has shown surprisingly close relation when the total credits of the literate suspect have been compared with his mental age as shown by the Goddard-Binet scale. With illiterates due allowance must be made. The advantage of this scale is also shown from the fact that the suspect receives credit for any work done, and not, as in the Binet scale, only on the result attained; also the problems are graded directly from the simple to the complex.

At a glance it seems simple, but not so when applied to immigration work, where one must take into consideration such physical conditions as vision, adenoids, hearing, defective nutrition, social conditions, race, age, sex, schooling, and any peculiar mental irregularities that may suggest psychoses. Two of the most valuable facts shown in the arrangement of this scale are that most of the tests for those under 13 are such as will bring out ability to learn, while for those over 13 it brings out the ability to reason and adjust past experiences to fit new surroundings.

While the point scale is undoubtedly a distinct step forward as an aid it has by no means solved the problem, for its standard of normal is based on school children and a comparatively small number of illiterate aliens who have lived for varying lengths of time in the United States. The authors realize this and have left the scale open for modification. At the Boston station it has been modified by substituting illiterate tests in place of certain tests in the scale that required some school training, and as opportunity has offered the two scales have been compared for results.

Before any of these tests are undertaken the alien's sight, hearing, and speech have been noted and allowance made if called for. For the purpose of determining sight defect a new form of test card for illiterates has been tried and compared, with the results obtained from the so-called illiterate E card. This new card was devised by Wolffberg, and contains a series of rows of pictures of common objects of everyday life graded in size to compare approximately with the standard Snellen type. This has proved an aid to the examiner, as it requires less explaining and gives an estimate of reaction time to the objects pictured and imagination as shown by correct recognition of silhouetted figures.

For children under 3, where a most delicate problem lies, defectives have been generally detected by observing their attitude toward their family and other children, by noting their reaction to bright colors, their mannerisms upon given a sheet of paper to play with, their ability to note and follow a flash-light, and their attitude in the problem of removing a small colored ball that had been placed under a glass.

When one considers the various definitions—medical, pedagogical, psychological, and sociological—as to what constitutes feeble-mindedness, the work of standardizing that which is normal, universally, must be carried farther, particularly in the case of immigrants, before the higher grade defective can be demonstrated. In reply to critics, it may be shown from past experience that a person who may be apparently normal in the country, owing to the more simple life, may show himself feeble-minded in the complex life of the city. Failure in simple money and calendar tests indicate among unskilled laborers incapacity for holding their own in business relations, and in one of adult age incompetence to manage his own affairs with ordinary prudence. High suggestibility combined with lack of reasoning power and ability to learn by experience make such ready tools for the unscrupulous. Tests for capacity to do things and will tests have yet to be placed on the plane with intellectual tests.

Although, on account of the war, the total number of immigrants arriving were less than for many years, the quality was poor, as shown by the percentage of certifications. It may be noted that the number certified, however, was only a small part of the number who were held and examined, subsequently passed because conclusive evidence could not be shown that they were actually feeble-minded within the meaning of the generally accepted social and medical definition.

Essentially feeble-mindedness is the same in the savage as in the civilized, in the illiterate as well as the literate. The difference is in the means of detecting this incapacity to provide for themselves and plan for their future in competition with their normal fellows or without supervision.

While the tests arranged at this station have not as yet been standardized, they have, however, attracted the attention of the teaching staff at the Boston Psychopathic Hospital, and Dr. H. M. Adler, chief of staff, has requested the use of our tests for comparison, and in turn is trying to assist in getting a standard that will apply to different races. They have also thought well enough of the illiterate picture scale to introduce it in the hospital for further investigation.

The question of interpreters is very important, and the examiner must assure himself that the subject and interpreter understand each other perfectly.

DETROIT, MICH.

For the fiscal year ending June 30, 1915, 4,535 aliens were examined at Detroit. This is an increase of 366 aliens over the preceding year. Of the 4,535 aliens examined, 3,895 were passed and 640 aliens were certified for disease or disability. Of the 640 aliens certified, 249 were deported and 391 landed.

The aliens arrived daily via 19 trains over 4 railroad lines, 2 ferry-boat lines arriving every 20 minutes, while Lake passenger steamers arrived at irregular intervals.

In addition to the medical inspection of arriving aliens, the medical officer at this port renders medical aid to the immigration prisoners detained at the various hospitals and jails on department warrants and also examines aliens in and around Detroit who have become public charges, to determine if their condition is a result of causes existing prior to landing in this country. The number of such cases at this port, also the aliens held on department warrants who require the professional services of the medical officer, exceeds that of any other Canadian border port.

Aliens afflicted with trachoma are sometimes admitted to the United States under bond, and are required to report to the medical officer until he pronounces them cured. There are several such cases who report to this office monthly.

The medical officer was detailed during the year to proceed to Jackson, Mich., to examine an alien afflicted with trachoma, and made two such trips.

During the year there were 10 boards of medical officers convened for the reexamination of aliens, 7 at the request of the medical officer and 3 by bureau order.

HONOLULU, HAWAII.

A total of 3,753 immigrants were inspected at this port during the year ending June 30, 1915, and 148 were certified for diseases or disabilities, in accordance with the immigration law. There was no Spanish or Portuguese immigration to Hawaii during the year. The vast majority of arriving aliens were orientals, and almost all of these were Japanese. The number of immigrants arriving in Hawaii has been steadily decreasing for several years, this being largely due to the importation of Philippine laborers to work on the plantations. The Filipinos are not subject to the immigration laws of the United States. The percentage of medical certificates

given for all causes was considerably smaller than during the preceding year, which is due principally to the fact that steamship companies have exercised greater care in the medical examination of aliens at the port of foreign embarkation. The distribution of the medical certificates according to nationality was as follows: Japanese, 57 class A, 62 class B, and 12 class C; Chinese, 3 class A, 6 class B, and 2 class C; Koreans, 2 Class A, and 2 class B; English, 1 class B; Italians, 1 class B. The largest number of rejections was due to trachoma, and almost all of these were Japanese. The following are the districts from which aliens arrived from Japan who were found to be afflicted with trachoma, the figures in parenthesis representing the number of cases coming from the districts named: Kumamoto (7), Kochi (1), Hiroshima (9), Miyaji (2), Yamaguchi (13), Fukuoka (5), Wakayama (1), Fukushima (1), Shimane (1).

During the year 3,603 aliens were examined for uncinariasis and 15 were found to be afflicted with this disease, and 12 of these were Japanese coming from the following-named districts in Japan: Hiroshima (1), Yamaguchi (1), Fukushima (2), Fukuoka (3), Niigata (2), Kanagawa (1).

HOSPITAL TREATMENT FURNISHED DISEASED ALIENS.

The number of aliens granted hospital treatment upon arrival at Honolulu with a view to effecting a cure of the disease and eventually permitting the cured aliens to land, was much smaller than during the previous year, due to the smaller number of diseased aliens who arrived.

Nearly all of those furnished treatment were afflicted with uncinariasis, it being the policy of the immigration authorities to permit the treatment of these cases almost without exception. This policy, however, does not apply to aliens afflicted with trachoma and other dangerous or loathsome contagious diseases, such afflicted persons being deported, as required by law.

The steamship companies engaged in transporting oriental aliens to Hawaii and to the Pacific coast ports on the mainland of the United States require these aliens to present a medical certificate showing them to be free from trachoma and uncinariasis before they will be accepted as passengers on vessels.

A competent medical examination at the port of foreign embarkation is of great value in preventing the embarkation of diseased aliens to the United States, but inasmuch as the efficiency of the foreign medical inspection of aliens is known to vary considerably in the various foreign ports of departure, the acceptance of a foreign medical certificate would be unwise even if such action was permitted by law, which fortunately is not the case. The efficiency of the medical inspection and treatment of aliens about to embark for the United States is much enhanced by the knowledge that such aliens are sure to receive a thorough examination by the United States medical officer at the port of arrival, and it would therefore be unwise to remove such a stimulus to the efficient conduct of the medical inspection and treatment of aliens prior to foreign embarkation.

Notwithstanding the medical inspection conducted by foreign medical officers prior to the alien's embarkation, it quite frequently

happens that aliens are found upon arrival to be markedly afflicted with a dangerous or loathsome contagious disease, which should have been detected prior to embarkation, although in every case these aliens will produce a foreign medical certificate as evidence of freedom from disease. Many such cases could be cited from the records of the station, but for the purpose of illustrating the value of a careful examination of arriving aliens, and the extent to which reliance can be placed upon an alien's foreign medical certificate, it will be sufficient to relate a case of recent occurrence: Lum Ning, a Chinese, sailed from Hongkong May 4, 1915. He arrived at Honolulu May 25, 1915, and was examined at the immigration station. He was found to be heavily infected with hookworms. He produced the usual foreign medical certificate, signed by two physicians in Hongkong, stating that he was free from hookworm and other diseases. At the request of the inspector in charge this alien was furnished hospital treatment, as the result of which 214 hookworms were recovered from the excretions. It is evident that this man had his hookworms at the time he received the medical certificate at Hongkong, and that his diseased condition could have been detected by a competent medical examination at that port.

LABORATORY EXAMINATIONS.

The new laboratory equipment installed during the spring of 1914 has been of inestimable value in facilitating the efficient conduct of the medical inspection of arriving aliens. The principal use made of the laboratory is in the examination of aliens for uncinariasis, and unceasing efforts have been made throughout the past year to bring this phase of the work to the greatest possible degree of efficiency.

The personnel of the laboratory consists of one medical examiner, one technical assistant, and one attendant. Considerable attention has been given to the training of the personnel in the work to be done, and many modifications in the original methods of procedure in hookworm examinations have been tried out during the year, with a view to the final adoption of a plan of procedure productive of maximum results and the elimination of all nonessentials. In addition to the hookworm work the laboratory is also adequately equipped and frequently used for making chemical and microscopic examinations for the determination of diseased conditions in aliens other than uncinariasis.

PUBLIC HEALTH LECTURES TO ALIENS IN DETENTION.

With a view to accomplishing some good in the interest of the public health, it was decided to deliver a series of public health lectures to large numbers of arriving aliens, shortly after their arrival at the immigration station, and in order to attract as much interest as possible to these lectures a stereopticon has been employed to illustrate the various features of the subjects discussed, and special efforts are made to present the subject in the most simple manner possible. It is believed that considerable good will eventually result from these lectures, even though only a few persons at a time are converted to the cause of better health.

CERTIFICATIONS.

During the year eight fines of \$100 each have been imposed against steamship companies for violations of the provision of this section of the immigration law which makes it unlawful for any person, including any transportation company other than railway lines entering the United States from foreign contiguous territory, or the owner, master, agent, or consignee of any vessel, to bring to the United States any alien subject to any of the following disabilities: Idiots, imbeciles, epileptics, or persons afflicted with tuberculosis, or with a loathsome or dangerous contagious disease, and if it appears to the satisfaction of the Secretary of Labor that any alien so brought to the United States was afflicted with any of the said diseases or disabilities at the time of foreign embarkation, and that the existence of such disease or disability might have been detected by means of a competent medical examination at such time, such person or transportation company, or the master, agent, owner, or consignee of any such vessel shall pay to the collector of customs of the customs district in which the port of arrival is located the sum of \$100 for each and every violation of the provisions of this section. The disease for which the above fines were imposed in accordance with the above provisions of the law were trachoma and uncinariasis. The fact is recognized and appreciated that it is sometimes a very difficult matter to determine with reasonable certainty whether or not an alien who upon arrival is found to be afflicted with one or more of the above-named diseases or disabilities, should be certified under the provisions of section 9 of the law.

Fully recognizing the possibility of working a hardship and injustice upon the steamship company, and also upon the diseased alien, as the result of certifications under this section, it has become the invariable custom to institute a careful investigation into all the conditions connected with such cases as may be suspected as coming under this section, and unless all the evidence is such as to make it reasonably certain that such diseases or disabilities really existed in a form susceptible of recognition by means of a competent medical examination at the time of foreign embarkation, such cases are not certified under section 9 of the immigration law, and no fine is imposed. For example, the fact is known that a person may become infected by hookworm several weeks prior to foreign embarkation, and at the time of the medical examination at the foreign port of departure may show no evidence whatever on the skin or in his feces of such infection, owing to the prompt healing of the eruption on his feet or hands where the worms have entered the body, and to the absence of ova in his feces due to the fact that the worms have not yet begun to deposit their ova, seven or eight weeks being required from the time the worm entered the skin to the appearance of their ova in the feces. Such a case, however, may show ova in his feces by the time he reaches port, the worms having accomplished their journey through the body, mated, and begun to deposit the eggs since he was last examined at the foreign port of embarkation. On the other hand, when an alien swears that he was found to be infected with hookworm after a medical examination, for which he received a course of treatment prior to foreign embarkation, and is perhaps able to exhibit a receipt

for money paid for the treatment before arrival, and finally the finding of the characteristic ova in his feces upon examination here, all this evidence taken together is considered sufficiently conclusive to warrant the issuance of a certificate under section 9 and imposing the fine.

To determine whether an alien found to be afflicted with trachoma upon arrival is a suitable case for certification under this section it is also the rule to carefully exclude all cases not showing reasonable evidence of the existence of the disease in a form recognizable by means of competent medical examination at the time of foreign embarkation. For example, an alien may become infected shortly before embarkation and show no evidence of the disease at the time of embarkation, and may arrive here with a well-developed case of trachoma in its first stages. Again, an alien may become infected on board the vessel en route to this port and show unmistakable evidence of trachoma upon arrival. Such cases are never certified under section 9. Furthermore, all so-called border-line cases, requiring days and weeks of detention in order to establish the diagnosis of trachoma, are also clearly unsuitable cases for certification under this section. On the other hand, an alien who arrives with unmistakable signs of trachoma in such a stage of development as to make it certain that no such condition of his lids could have developed since the date of foreign embarkation, and who also swears that he received treatment for the condition of his eyes for period of several weeks or more prior to embarkation, and perhaps is also able to exhibit a receipt for the money paid for treatment of his eyes before arrival—all this evidence, taken together, is considered ample to establish the fact of the existence of the disease in a form recognizable by competent medical examination at the time of foreign embarkation, and such cases are so certified under section 9 of the immigration law, and the fine is imposed.

MANILA, P. I.

The medical inspection of the alien immigrants who desire to enter the Philippine Islands is made at the several ports of entry by officers of the United States Public Health Service. The United States immigration laws are in effect in the islands, and the officers detailed as quarantine officers also conduct the immigrant medical inspections. This work is of considerable importance, as a number of the diseases which are excludable by the immigration laws do not prevail in the Philippine Islands, and it is important that the type of trachoma which produces blindness, favus, and other similar communicable diseases, and yet not quarantinable, be not introduced into the Philippine Islands, where a most fertile field exists for their introduction and spread.

In conducting the medical inspection of aliens there were 1,468 examinations made for the purpose of determining whether the arriving aliens were afflicted with uncinariasis. Of those examined 47 resulted positively for hookworm. Treatment was allowed these aliens. All were in time pronounced negative but 10 who were certified; 6 of this number received subsequent treatment until negative, and 4 were deported.

The nationalities represented in these examinations, with the percentage of infection, is shown by the following table:

Nationality.	Number examined.	Number positive.	Percentage with.
Chinese.....	451	17	3.77
Japanese.....	637	13	2.04
East Indians.....	66	8	12.12
Malays.....	252	9	3.57
All others.....	62	0	0.00
Total.....	1,468	47	3.20

During the year there were 8,294 arriving immigrants inspected. Of these, 43 were certified on account of having dangerous contagious or loathsome diseases, as follows: Trachoma 29, hookworm 10, favus 4. Trachoma still leads the list in the causes for rejection. The nationalities represented in the rejections were as follows:

East Indians.....	4
Chinese.....	9
Japanese.....	30
Total.....	43

At the immigrant medical inspection made at the various ports of the Philippines during the year ended December 31, 1914, the nationalities represented by the immigrant aliens were as follows:

Chinese.....	2,383	Russian.....	26
Dutch and Flemish.....	4	Scandinavian.....	3
East Indian.....	61	Scotch.....	24
English.....	134	Spanish.....	207
French.....	23	Syrians.....	2
German.....	83	Turkish.....	5
Irish.....	7	Other people.....	26
Italian.....	8		
Portuguese.....	7	Total.....	4,032

NEW YORK, N. Y.

On account of European war conditions the year that has just closed has been marked by a notable decrease of immigration to this port as compared with previous years, the number of arriving aliens having fallen to slightly more than one-fourth of the number entering New York during the fiscal year 1914. This decrease has been due principally to the practical stoppage of immigration from central and eastern Europe.

Owing to these conditions the relatively larger medical staff has been able to discharge its functions more efficiently, as indicated by the results, 3.26 per cent of arriving aliens having been certified for various mental and physical disqualifications, as compared with 2.29 per cent of certifications for the preceding year.

The proportion of certifications for mental defects has been 135 per 100,000, as compared with 96 per 100,000 for 1914 and 50.8 per 100,000 for 1913. The advantage of a corps of officers trained in mental medicine is shown by the fact that during this year there has been a noticeable percentage increase in the certificates of insanity, 22 per 100,000—more than double that of a year ago, and the highest in the history of the station.

It has also been possible to make certain experimental changes in the methods of examination, the results of which are of much interest.

Instead of the routine method of inspection while the aliens were passing in review it has been practicable at times, when the arrivals were not too numerous, to take entire shiploads of steerage immigrants into the private examination rooms and give them all a thorough physical examination. The results of this method during a period of six months as compared with the results of the routine inspection during the same period are set forth in the subjoined table.

In the first place, on account of the relatively larger numbers of medical officers engaged in it, the routine examination was more efficient than formerly, the certificates having been 5.37 per cent, as compared with 2.29 per cent during the last fiscal year. The intensive physical examination of all aliens, however, showed an increase of certifications to 9.37 per cent. It therefore appears that the better method of sifting out aliens suffering from physical disease or defect is that whereby each individual is given deliberate examination. The so-called line inspection is probably effective in detecting most of the aliens suffering from grave defects, but many of them must inevitably escape when this method is employed.

Physical examination of arriving aliens at Ellis Island, New York Harbor, from Oct. 4, 1914, to Mar. 31, 1915, inclusive.

Total number of aliens examined.....	43, 069
Number of aliens examined by routine method.....	31, 275
Number of aliens examined intensively.....	11, 794
Total certified, result of routine method.....	1, 677
Total certified, result of intensive examination.....	1, 106

Of 31,275 aliens examined by routine method, 1,677 were certified, or 5.37 per cent.

Of 11,794 aliens examined intensively, 1,106 were certified, or 9.37 per cent.

Conditions which required certificates.

	Intensive method.		Routine method.	
	Certified.	Per cent.	Certified.	Per cent.
Aliens examined physically.....	11, 794		31, 275	
Dangerous contagious diseases.....	27	0.23	76	0.24
Loathsome contagious diseases.....	37	.31	8	.03
Tuberculosis.....	1	.01	8	.03
Insane.....	1	.01	12	.03
Mental defectives.....	28	.23	87	.28
Physical diseases and defects.....	1, 012	8.58	1, 486	4.76
Total.....	1, 106	9.37	1, 677	5.37

An increase of the medical staff, therefore, when immigration again approaches normal conditions seems to be indicated in order that sufficient time may be afforded for a closer physical examination. The apprehended irruption of contagious diseases after the close of the war, and the fact that Ellis Island is, in effect, a second line of sanitary defense, add weight to this consideration.

The preparation of a manual of mental examinations begun by direction of the Surgeon General is nearing completion. The exhaustive mental examination of a number of normal aliens undertaken by a member of the medical staff in connection with the preparation of this manual has been completed and the results submitted to the bureau.

There has been no noteworthy change in the character of the work done in the two immigrant hospitals except that the number of aliens held for treatment has been relatively greater in proportion to the total amount of immigration. This has been due largely to the impossibility of deporting many certified aliens to countries in the war zone.

The following report upon the work done in the station laboratory is submitted:

During the past year the laboratory has accumulated a certain quantity of new material and apparatus, and while still in need of many things is now fairly well equipped. During the year an additional room has been acquired and a small working library obtained. Most of the work has been in the nature of routine work for the hospitals and for the inspection line, but some new work has been undertaken. The lack of assistance is felt in trying to undertake work outside of routine.

The following is a brief account of the work actually done during the year:

Wassermann reactions	320
Examinations for gonorrhea, including several cultures (vulvovaginitis of children)	310
Throat cultures for diphtheria	281
Stools examined for hookworms	107
Miscellaneous examinations, including Widal's, blood cultures, stomach contents, dark-field work, blood counts, miscellaneous cultures, sputa, urine, spinal fluid, milk tests, sections of tissue, autogenous vaccines, favus and ringworm examinations, and cultures, etc.	205

Making a total of 1,223 examinations of all kinds.

In addition to this routine work, about 1,000 Wassermann reactions have been done on persons passed on the line inspection, and this work is being continued.

Studies have also been made by culture and smears and in other ways of some 36 cases of trachoma, including inoculations into animals. There have been some cultural studies on an organism infecting laboratory guinea pigs, and cultural studies on the gonococcus in comparison with *M. catarrhalis* and the meningococcus. Some monkeys have been inoculated with material from mumps and scarlet fever and sent to the Hygienic Laboratory.

As for comment on the year's work, it may be said that the laboratory has been slowly organized and equipped, and is now ready for almost any ordinary laboratory procedure; the results obtained have fully warranted the efforts made to improve it. The facilities could be largely increased by a very modest expenditure, which should be made. There is a great need for experienced help, and the detail of another officer in the laboratory is deemed advisable. The experience of the past leads to the belief that there is not another place in the service where there is more opportunity for good research work from the laboratory side; and the expenditures involved would be very modest.

Through the courtesy of Dr. August Hoch, of the Institute of Psychiatry at Wards Island, N. Y., two medical officers have been detailed to that institution for investigation during the year, and have had access to the wards of the Manhattan State Hospital through the kindness of the superintendent, Dr. William Mabon.

During the year passengers arrived at New York from foreign ports, as follows:

Aliens in cabin	102, 743
Aliens in steerage	139, 979
Total aliens	242, 722
Citizens, cabin	103, 402
Citizens, steerage	28, 264
Total citizens	131, 666
Grand total aliens and citizens	374, 388

Medical certificates.

Class A (1), including 5 idiots, 33 imbeciles, 64 insane, 299 feeble-minded, 4 epileptics, 26 aliens certified for tuberculosis	431
Class A (2), loathsome contagious or dangerous contagious	637
Class B, disease or defect which affects ability to earn a living	6, 653
Class C, disease or defects of less degree	208

Disposition of immigrants certified.

Class A (1) :	
Cases pending at beginning of year	17
Cases certified during year	431
Total to be accounted for	448
Cases deported	327
Cases landed	81
Cases pending close of year	40
Class A (2) :	
Cases pending beginning of year	53
Cases certified during year	637
Total to be accounted for	690
Cases deported	509
Cases landed	103
Cases pending close of year	78
Class B :	
Cases pending beginning of year	143
Cases certified during year	6, 653
Total to be accounted for	6, 796
Cases deported	894
Cases landed	5, 838
Cases pending close of year	64
Class C :	
Cases pending beginning of year	1
Cases certified during year	208
Total to be accounted for	209
Cases deported	8
Cases landed	200
Cases pending close of year	1

HOSPITAL CASES.

In the two immigrant hospitals there were treated during the year 5,754 cases.

Immigrant hospital (general) :

Remaining at beginning of year	149
Admitted during year, including 10 born in hospital	4, 946
Total to be accounted for	5, 095
Discharged	4, 929
Died	28
Remaining at close of year	166

Immigrant hospital (contagious diseases) :

Remaining at beginning of year	30
Admitted during year	629
Total to be accounted for	659
Discharged	633
Died	17
Remaining at close of year	26

Upon the request of the commissioner of immigration, medical officers visited 158 aliens who had become public charges or inmates of various institutions in New York and the vicinity, and examined them to determine the nature of the disease or defect, and to ascertain whether due to causes existing prior to landing.

Summary of hospital transaction at Ellis Island.

Number of patients in hospital at beginning of year	179
Patients admitted to hospital during year	5, 575
Total treated (men 2,416, women 1,849, male children 753, female children 736)	5, 754
Births (male 5, female 5)	10
Deaths (men 11, women 7, male children 16, female children 11)	45
Pay patients treated during the year	5, 340
Free patients treated during the year	414
Days treatment for pay patients	72, 037
Days treatment for free patients	5, 432
Total days treatment for hospital cases	77, 469
Maximum number of patients in hospital at any one time during the year	329
Daily average number of patients in hospital	213
Patients in hospital at end of year	192
Immigrant hospital :	
From previous year	179
Admitted during year	5, 575
Total treated	5, 754
Recovered	3, 820
Improved	648
Not improved	1, 049
Died	45
Remaining end of year	192
Days treatment	77, 469

Nativity and race of immigrants certified for trachoma during the fiscal year ended June 30, 1915.

Nativity.	Algerian.	African, black.	Albanian.	Armenian.	Bulgarian.	Croatian.	Chinese.	English.	Flemish.	French.	Finnish.	German.	Greek.	Hebrew.	Hindu.	Italian, north.	Italian, south.	Irish.	Japanese.	Lithuanian.	Magyar.	Maltese.	Macedonian.	Pole.	Persian.	Portuguese.	Ruthenian.	Roumanian.	Russian.	Slovak.	Spanish.	Syrian.	Scandinavian.	Scotch.	Total.	
Algerian.....	1					1						3		1							1			3			2	1		1				1		13
Austro-Hungary.....																																				1
Belgium.....									1																											1
British.....																																				1
British East Indies.....																																				1
British West Indies.....		7													1																				1	
China.....							15																												7	
Cuba.....																																				1
Danish West Indies.....		1																																		1
French.....										3														1												46
Germany.....													45	1																					3	
Greece.....																																				1
Japan.....																3	126																		129	
Italy.....																																				1
Norway.....																										2									2	
Persia.....																																				2
Portugal.....																																				2
Roumania.....																																				2
Russia.....											2	4		24					15					27											77	
Spain.....																																13			13	
Sweden.....																																				4
Turkey.....			1	18	1								6	6									1										67		100	
United Kingdom.....								2										5																	8	
Total.....	1	8	1	19	1	1	15	2	1	3	2	7	51	34	1	3	126	5	3	15	1	1	1	31	2	2	2	1	4	1	13	68	5	1	432	

Summary of clerical work incident to the medical inspection of immigrants.

Permits and admission record cards sent to hospital and filed in office upon admission of patients	22,300
Notices to steamship companies upon admission of patients	1,990
Certificates rendered of arriving aliens	7,929
Certificates rendered of public-charge cases	158
Certificates rendered of infancy cases	252
Cases held for mental and physical examinations	3,297
Receipts on hand for money and valuables (\$2,243, 21 watches, 38 pieces of jewelry)	82
Receipts given patients for money and valuables held for safekeeping (in amount, \$175,428.48; watches, 926; pieces of jewelry, 2,164)	3,136
Receipts canceled in money and valuables returned to patients (in amount, \$168,075.90; watches, 929; pieces of jewelry, 2,139)	3,126
Receipts for money and valuables still on hand (in amount, \$8,575.58; watches, 18; pieces of jewelry, 63)	92
Daily report of hospital transactions rendered to the commissioner of immigration and chiefs of divisions	2,190
Reports of immigrants placed in hospital rendered to chief of registry division	741
Ship surgeon's reports of diseases and injuries occurring among immigrants during voyage received and filed	741
Vouchers received and forwarded for payment	1,120
Checks received and forwarded	2,045
Letters and telegrams received	2,000
Letters and telegrams sent	2,356

Causes of death.

Immigrant hospital:		Edema, lungs-----	1
Valvular disease of heart-----	1		
Debility, congenital-----	3	Total-----	28
Bronchitis, chronic-----	1	Contagious-disease hospital:	
Cerebrospinal fever-----	1	Measles-----	12
Tuberculosis-----	8	Scarlet fever-----	1
New growth, malignant-----	2	Whooping cough-----	1
Bronchopneumonia-----	7	Cerebrospinal fever-----	1
Osteomyelitis-----	1	Diphtheria-----	1
Carcinoma-----	1	Organic diseases of heart-----	1
Bright's disease, chronic-----	1		
Insane-----	1	Total-----	17

Race and sex of immigrants admitted to hospitals during fiscal year ended June 30, 1915.

Race.	Men.	Women.	Children.		Total.
			Male.	Female.	
African, black	425	547	61	58	1,091
Armenian	41	10	4	4	59
Albanian	45	4	1		50
Arab	16	3			19
Bulgaria	11		2	1	14
Brazil	3				3
Bohemian	4	8	7	11	30
Belgium	1	1			1
Canada	1				1
Cuban	9	4	2		15
China	40	2		1	43
Croatian	17	4			21
Dalmatian	2	1	1		4
Dutch and Flemish	21	20	27	32	100
England	60	49	20	16	145
Finnish	12	13	15	5	45
France	25	12	4	4	45
Greece	235	77	51	24	387
German	63	49	19	31	162
Polish	43	69	31	33	176
Hindu	21		2	1	24
Hebrew	177	120	59	57	413
Irish	135	82	11	10	238
Italy, south	440	484	288	294	1,506

Race and sex of immigrants admitted to hospitals, etc.—Continued.

Race.	Men.	Women.	Children.		Total.
			Male.	Female.	
Italy, north.....	26	21	19	15	81
Japan.....	3		2		5
Luxemburg.....	1				1
Lithuanian.....	12	16	1	6	35
Magyar.....	6	31	29	29	95
Maltese.....	1				1
Montenegro.....	3				3
Morocco.....	1				1
Macedonian.....	23				23
Mexican.....	6	3		1	10
Moravian.....	1			1	2
Portuguese.....	33	13	12	8	66
Persia.....	4	1	1		6
Ruthenian.....	9	18		9	36
Roumanian.....	8	8	3	2	21
Russia.....	13	3	4	5	25
Spanish.....	82	22	6	4	114
Syrian.....	81	26	4	13	124
Scotland.....	15	8	1	1	25
Scandinavian.....	89	52	15	8	164
Slovak.....	9	12	6	10	37
Servian.....	18				18
Turkey.....	2				2
Wales.....	2	5	1	7	15
Not specified.....	50	11	3	9	73
Total.....	2,344	1,809	712	710	5,575

Races of immigrants deported on medical certificate during fiscal year ended June 30, 1915.

Race.	Men.	Women.	Children.		Total.
			Male.	Female.	
Algerian.....	1				1
Albanian.....	26	2			28
Armenian.....	12	1			13
African, black.....	50	21	1	3	75
Bohemian.....	1	1			2
Bulgarian.....	13	1			14
Croatian.....	7	2			9
Cuban.....	4				4
Chinese.....	15				15
Dutch and Flemish.....	1	1		2	4
Dalmatian.....	1				1
East Indian.....	26				26
English.....	29	16	2	1	48
Finnish.....	4	1			5
French.....	10	2			12
Greek.....	247	22	5	3	277
German.....	28	4	1		33
Hindu.....	3		1	1	5
Hebrew.....	128	31	2	2	163
Irish.....	47	23	1		71
Italian, north.....	4			1	6
Italian, south.....	301	235	23	24	583
Japanese.....	1		2		3
Lithuanian.....	10	10			20
Maltese.....	1				1
Macedonian.....	8				8
Montenegrin.....	1	1			2
Magyar.....	15	1			16
Portuguese.....	14	2			16
Polish.....	40	20	1		61
Ruthenian.....	20	5			25
Russian.....	12	3			15
Roumanian.....	7				7
Swiss.....	1				1
Servian.....	2	1			3
Slovak.....	20	6			26
Scotch.....	7	2			9
Scandinavian.....	21	10	1		32
Syrian.....	56	3			59
Spanish.....	28	5	1		34
Turkish.....	1				1
Welsh.....	2	2			4
Total.....	1,225	434	42	37	1,738

SAN FRANCISCO, CAL.

During the fiscal year ending June 30, 1915, 16,956 immigrants were inspected by the medical officers of this station, this number representing practically the same amount of work as that performed last year. To be exact, there were 34 more this year than during the fiscal year 1914. Of this number, 7,316 were brought from the vessels upon which they arrived to the hospital on Angel Island for more extended examination, and of the number thus brought 1,080 were certified to the Commissioner of Immigration as being afflicted with some condition which, under the provisions of the immigration law, should be brought to his attention. This list includes 128 different affections, and ranges all the way from practically unimportant diseases, such, for instance, as pterygium, to dropsical beriberi, resulting in death.

The large number of persons undergoing hospital examination is attributable to the same routine as obtained last year, namely, that of detaining practically all second and third cabin aliens until a microscopical examination to determine the presence or absence of hookworm ova could be made. There have been a few exceptions made to this rule if unusual circumstances seemed, in the medical officers opinion, to justify such exceptions.

The smaller number of medical certificates issued this year, in comparison to the number in 1914, is partially due to the decreased number of persons certified as having uncinoriasis, there being 124 fewer cases of this disease during 1915, and this falling off is doubtless due to more efficient examination previous to embarkation, as the transportation companies continue to demand a hookworm-free certificate before selling the applicant a steamship ticket. Notwithstanding this decrease in numbers, the fact that 486 aliens were found to be infected with this disease upon arrival at this port establishes beyond question the necessity for the continuance of microscopical examination to determine the possible presence of this condition and illustrates the error that would result if hookworm-free certificates were accepted here at their face value.

The Pacific Mail Steamship Co. has discontinued the practice of treating hookworm disease on board their vessels en route to San Francisco from Hongkong and has thereby eliminated the necessity, which existed last year, for the application of a fine against the company provided the recipients of hookworm treatment were not cured upon their arrival at this port.

The greater number of certificates issued this year for trachoma—more than double the number issued in 1914—is attributable to two reasons, first, due to the presence of an additional medical officer for a portion of the year; the medical division was, during that time, enabled to examine the crews of all incoming vessels, a procedure which had hitherto been impossible and which resulted in the detection and certification of 46 cases of this disease among crew men; and second, the different system in vogue of examining departing aliens at the port of Hongkong, such examinations being now, according to statements received, taken out of the hands of the steamship surgeons.

More venereal disease has been found this year than last, but, on the other hand, a smaller number of cases of pulmonary tuberculosis have been detected.

Generally speaking, the work of the medical division has run smoothly, and from a strictly medical standpoint the percentage of recoveries among those ill in hospital has been very gratifying. The hospital has at times been unduly crowded and its resources taxed beyond its physical limits. At this time it is reported that there are aliens detained in the detention sheds who are certified for some condition and who must pass through the hospital before finally landing, which fact illustrates that the station should be equipped with hospital facilities of sufficient size to handle without delay the maximum business of the station.

DOMESTIC (INTERSTATE) QUARANTINE.

Plague-suppressive measures were instituted at New Orleans on July 6, 1914. From the date of the recognition of the disease, June 27, 1914, to the end of the present fiscal year, 30 human and 244 rodent cases were diagnosed. The importance of the outbreak, the first in the history of the Atlantic seaboard, can only be estimated by those familiar with every aspect of the disease. Measures for the control of the disease have been continued throughout the year. At San Francisco and its environs, and at Seattle, Wash., plague-preventive measures have been conducted along the lines developed in former years. Rocky Mountain spotted fever, a disease peculiar to the Northwest, has been combatted in the Bitter Root Valley, where it is most virulent. Surveys to determine the prevalence of the infection, which is of great economic importance, have disclosed the fact that it is much more widespread than is commonly supposed. The interstate quarantine regulations and the amendments thereto, two of which were promulgated during the year, have been enforced, as in previous years. Revision of the existing regulations is now under way. The sanitary and relief work in Alaska, performed in cooperation with the Bureau of Education, has been continued. In compliance with Executive order, all Government buildings in the District of Columbia have been regularly inspected. An extensive exhibit has been installed at the Panama-Pacific International Exposition, and the sanitation of the buildings and grounds of the exposition, together with the care of sick and injured, has also devolved upon this division.

PLAGUE-SUPPRESSIVE MEASURES IN NEW ORLEANS.

The presence of bubonic plague in New Orleans was first officially made known to the public June 27, 1914. On this date Dr. Oscar Dowling, president of the Louisiana State Board of Health, sent a telegram to the Surgeon General, stating that Dr. W. T. O'Reilly, superintendent of public health, had reported one case of human plague. Acting upon this information, the Surgeon General proceeded to New Orleans, arriving July 1, 1914. An investigation was made, and the diagnosis of plague received service confirmation.

In response to requests from many organizations, the city board of health, and the State board of health, Surg. Gen. Blue was placed in charge of eradication measures by the Secretary of the Treasury, and plans were consummated for the service to assume charge of the situation, with the cooperation and aid of the city and State authorities. On July 3, 1914, Asst. Surg. Gen. W. C. Rucker was ordered to New Orleans to take charge of the service forces, and shortly after his arrival the Surgeon General returned to Washington.

The service assumed charge of eradication work on July 6, 1914. Additional officers were ordered to New Orleans, headquarters were secured, and a definite plan of campaign mapped out.

The service operations were conducted by Asst. Surg. Gen. Rucker up to December 18, 1914, when he was succeeded by Surg. G. M. Corput. Surg. Corput was relieved by Surg. R. H. Creel on March 17, 1915, who remained in charge until the end of the fiscal year.

INCEPTION OF THE EPIDEMIC.

When and how plague entered New Orleans is a matter of conjecture. Ships arrive at New Orleans from Cuba, Liverpool, and the Canary Islands, all known to have been infected at one time or another at comparatively recent dates.

The water front conditions of New Orleans were such that rodent infection could have been introduced, and for a limited period of time remain confined to the wharves till a rise of the river would drive the rats inland and across the city. The rapid extension of the infection into "clean" areas of the city during August and September rather militated against any probability that the infection had been present, though quiescent, for a long period of time.

The first case of human plague in New Orleans officially recognized was that of C. L., who died in the Charity Hospital on June 28, 1914. The onset of illness in this case was not definitely determined, but is recorded as occurring on the 19th of June. However, previous to this case an autopsy was performed, June 17, 1914, in the Charity Hospital, on the body of T. B., a young white man, 18 years of age, who had died of symptoms highly suggestive of bubonic plague. The onset of symptoms in this case dated back to June 13, and while it was never officially recognized as plague, the fact that he worked in the plague-infected district, at South Peters and Commerce Streets, together with the symptoms and autopsy findings, makes it rather certain that this was a case of plague. That there might have been earlier unrecognized cases of plague in New Orleans is open to speculation, since the case of T. B. would probably have gone unrecognized had an autopsy not been performed.

The second case of bubonic plague, officially recognized as such, occurred in the person of a fellow employee of C. L. This second case of plague was R. W. W., who sickened on June 26, and was confirmed as plague on June 29. He ultimately recovered. Both R. W. W. and C. L. lived in a large rooming house, 713 St. Joseph Street, managed by the "Volunteers of America." They lived on separate floors, in rooms quite distant one from the other. Both men, however, worked in a stable at 424 Notre Dame. This building was used in part as a stable and part as a storage warehouse for paper and rags collected by the benevolent association known as the "Volunteers of America." R. W. W. worked as a hostler and C. L. was employed about the place for the purpose of assorting the paper and rags. No infected rats were ever found at 713 St. Joseph nor evidence of infection at that place. While the infection was not actually demonstrated to exist at 424 Notre Dame, a large number of mummified carcasses was found in the place upon the removal of the floor. The building of 424 Notre Dame was located some three

or four blocks from the river, being nearer the wharves of the United Fruit Co. than to any other river-front property.

The epidemic progressed, human cases occurring at intervals until the 1st of October, the last human case being that of C. Y., a Chinaman, who sickened on September 30 and died on October 4. Thirty cases in all were recorded, 20 recovering and 10 dying. Table 1 gives a résumé of the various facts pertaining to human cases. The hospitalization and treatment of the cases was attended to by the city board of health.

Rodent plague was not discovered until several thousand rats had been examined. In the first week after the assumption of eradication measures by the service a plague-infected rat was trapped, on July 11, at 1914 Magazine Street. The diagnosis of this rodent case was confirmed on July 16, on which date two other rodents, captured on July 12, were likewise proven positive.

Human plague cases in New Orleans.

Serial No.	Date. ¹	Age.	Sex.	Race.	Termination.	Type of disease.	Source of infection.	Association with rodent plague.
1	1914. June 19	40	Male	White	Death	Septicæmic	424 Notre Dame. Employment, stable.	Not proven; mummified rat carcasses taken from beneath flooring, 424 Notre Dame.
2	June 26	50	do	do	Recovery	Bubonic, left femoral.	do	do
3	June 28	8	do	Negro	Death	do	Unknown	No evidence of infection at residence; said to have frequented wharves.
4	July 5	28	do	do	do	Bubonic, right axillary.	429 Poydras. Employment, produce store.	Not proven; rodent infection in adjoining block.
5	July 9	35	Female	do	Recovery	Bubonic, left femoral.	307 Lafayette. Employment, restaurant.	Not proven; rodent case 4 in adjacent building.
6	July 16	10	do	White	do	Bubonic, right femoral.	532 Camp, residence	History of dead rats in yard prior to illness; infected rodents in adjoining premises.
7	July 13	15	do	Negro	do	Bubonic, left femoral.	611 Fulton Street. Employment, warehouse.	Not proven. Human case in adjoining block.
8	July 16	28	Male	White	do	do	2845 Baronne, residence.	Not proven. Rodent case on adjoining premises.
9	July 20	73	Female	do	Death	Septicæmic	532 Camp Street	See human case No. 6.
10	July 21	50	Male	do	Recovery	Bubonic, right femoral.	601 Fulton. Employment, saloon.	Not proven; human case 5 across street; rodent case in adjoining block.
11	July 24	41	do	do	do	Bubonic, left femoral.	532 Camp. Employment, janitor.	See human case No. 6.
12	July 23	24	do	Negro	do	Bubonic, right femoral.	611 Canal. Employment warehouse.	Rodent case in adjoining premises; human case 5 in contiguous block.
13	July 22	16	Female	do	do	Bubonic, left femoral.	1904 Bienville. Employment, grocery store.	Human cases 19 and 20 across street; no plague rodent captured on premises.
14	July 29	22	Male	do	do	Bubonic, right femoral.	Girod & Front R. R. yard laborer, employment.	History of dead rats in railroad yard where patient worked; plague rodent captured July 28 on same premises.
15	Aug. 11	20	Female	White	do	Bubonic, left femoral.	1836 Iberville. Combined grocery and dwelling.	Not proven.
16	Aug. 7	17	Male	do	do	do	1836 Iberville	Not proven; sequestered case.
17	Aug. 6	52	do	do	do	do	Dumaine & Decatur. Vegetable market, employment.	Rodent case captured July 28 in the market.
18	Aug. 15	72	do	Chinese	Death	Septicæmic	916 Toulouse Street. Employment, restaurant.	Infected rodent taken from adjoining premises Aug. 1 and Aug. 4.
19	Aug. 16	40	Female	Negro	do	Bubonic, right femoral.	1905 Bienville, residence	Not proven; threw a dead rat into garbage can few days prior to illness.
20	Aug. 17	24	do	do	Recovery	Bubonic, left femoral.	do	See case No. 19.
21	Aug. 26	84	do	do	Death	do	1734 Felicity, residence	Not proven; rear of premises abutted on 1824 Baronne. See human case No. 25.

22	...do....	30	Male.....	White....	Recovery ...	Bubonic, right femoral.	Unknown.....	Not proven; residence badly rat infested.
23	Aug. 29	19	...do.....	...do.....	...do.....	Bubonic, left femoral.	421 Harmony, residence.....	Infected rat taken from adjoining property on July 29.
24	Sept. 1	12	Female...	...do.....	...do.....	...do.....	1742 Touro, residence and grocery combined.	Picked up dead rat in rear yard Aug. 23.
25	...do....	19	Male.....	...do.....	...do.....	Bubonic, right femoral.	1824 Baronne, residence.....	See case No. 21.
26	Sept. 21	40	Female...	Negro....	Death.....	...do.....	824 Burgundy, residence.....	Infected rat trapped on adjacent premises July 29.
27	Sept. 20	43	Male.....	White....	...do.....	Septicemic.	1463 Bourbon, residence and grocery combined.	Infected rat taken from adjoining property on following day.
28	Sept. 21	18	Female...	...do.....	Recovery ...	Bubonic, right femoral.	910 Elysian Fields, residence.....	Infected rodent in adjoining block.
29	Sept. 30	4	Male.....	...do.....	...do.....	...do.....	1573 Chippewa, residence.....	Infected rats taken in adjoining block.
30	...do....	51	...do.....	Chinese..	Death.....	...do.....	1120 Tulane Avenue, residence.....	Infected rodent taken from adjoining block.

¹ Date on which symptoms were first noticed by patient.

Cases are tabulated in the order they were bacteriologically confirmed. All premises were treated by sulphur fumigation, grounds sprayed with pulicide solution (coal-oil emulsion), rodent harborage destroyed, and rat-proofing initiated.

The history of human case No. 24 illustrates the obscure facts that occasionally surround a case and cause confusion as to the source of infection. At the time of the discovery of the case there had been no rodent plague discovered in that vicinity, neither could there be elicited any information as to the presence of dead rats, etc. It was only subsequent to the recovery of the patient that a further investigation revealed the fact that she had picked up a dead rat in the rear yard of her home some two or three days prior to the onset of symptoms.

Under the heading "Epizootic" the subject of rodent plague will be discussed at greater length.

GENERAL ORGANIZATION.

Upon assuming charge of eradivative measures Asst. Surg. Gen. W. C. Rucker secured headquarters at 163 Dryades Street, a centrally located building, with commodious office rooms, inclosed by spacious grounds containing outhouses sufficient for the storage of supplies and materials. The staff of the medical officer in charge was composed of Surg. G. M. Corput, in charge of outgoing quarantine; Surg. R. H. Creel, executive officer; Asst. Surg. C. L. Williams, in charge of the laboratory; and the following-named officers for field work: Passed Asst. Surg. Friench Simpson, Passed Asst. Surg. Hugh de Valin, Passed Asst. Surg. R. A. Kearny, Passed Asst. Surg. J. M. Gillespie, and Asst. Surgs. Francis A. Carmelia, H. F. White, C. V. Akin, and M. S. Lombard, and Acting Asst. Surg. Mark D. Hollis. At a later date Passed Asst. Surg. Norman Roberts, Passed Asst. Surg. C. W. Chapin, and Asst. Surgs. Carl Michel, F. M. Faget, and J. H. Smith were ordered to New Orleans for duty in plague suppressive measures. Acting Asst. Surgs. G. McG. Stewart, T. B. L. Layton, and F. Turney were assigned to assist Surg. G. M. Corput in the outgoing quarantine division. Acting Asst. Surg. H. King was employed for the inspection of the dead. Pharmacist W. H. Keen was ordered to New Orleans for duty, and acted as chief clerk at headquarters.

The plan of campaign decided upon embraced both general and special measures. Under general measures fell the educational campaign, rodent destruction, laboratory examination, ratproofing, adequate collection and disposal of garbage, and outgoing quarantine, both maritime and overland. Under special measures fell the treatment of foci by fumigation, destruction of fleas by pulecide solution, and summary destruction of rodent harborage in and about each focus.

As soon as headquarters were selected and equipped the city was divided, for administrative purposes, into seven districts, each under a medical officer, and the officers in charge of such districts were given specific and definite instructions as to the measures to be carried out under their supervision.

In the second month of the epidemic, on account of the persistent occurrence of human plague in the wholesale produce section (the district where human plague was first discovered), this territory was separated from district 1, and as district sub 1 was placed under the charge of Passed Asst. Surg. Friench Simpson, who had theretofore assisted at headquarters in the general organization. At a still later date district sub 7 was separated from district 7, so that altogether there were nine sanitary districts.

For duty at headquarters there were appointed an adequate force of clerks and stenographers, a purchasing agent, carpenters, and such laborers as were needed. All employees were selected at headquarters and from there assigned to the various districts.

In the selection of trappers especial attention was paid to physical fitness, although mental qualifications were not disregarded. Men with an honorable discharge from the United States Public Health Service, Army, or Navy were given preference. Higher qualifications were exacted from those applying for the position of inspector. A number of this class of employees were civil engineers, architects, and men with practical experience in building. However, practical demonstration in the field was the main test required of inspectors. If they proved themselves adaptable and were efficient their services were retained, otherwise they were discharged. With a few exceptions the men selected proved themselves proficient and their services were satisfactory.

The position of "rat-proofing" inspector demands rather unusual qualifications. Not only must the inspector be possessed of technical knowledge, but he must have great forbearance and be firm without exhibiting discourtesy. These men generally have to bear the brunt of the abuse directed by recalcitrant property owners against the system of rat proofing. Considering the urgent necessity for placing a large force of untrained men in the field, the service was fortunate in this campaign in being able to gather together a very competent force of inspectors.

DISTRICT ORGANIZATION.

On the assignment of an officer to a district he was given instructions containing the general measures to be observed by him in carrying out eradication measures, and uniformity of service operations throughout the city was maintained. Each district officer was provided a suitably located office, with sufficient clerical force and means of transportation.

The sanitary district was the unit of field operation. Subject to the guidance of general orders from headquarters the district officer had supervision over the activities of the rat-proofing inspection force, trapping squads, and fumigating and wrecking crew.

The field officers submitted to headquarters a daily time report of employees on duty and changes in the district personnel, requisitions for daily supplies, and a daily field report relating to the work performed. A weekly report of the trapping record of each trapper was also submitted. This report does not admit of a detailed account of district administration, except such as is mentioned under the headings of "Trapping" and "Rat proofing." The efficiency of the field force was largely dependent upon the administrative zeal of the district officer, and it may be said that the effectiveness of the service work in New Orleans has been due in a large degree to the energy and resourcefulness of the field officers.

To each district was assigned a rat-trapping force. The duties of the men were confined solely to trapping and poisoning of rats. A force of building inspectors was also provided for the purpose of inspecting rat proofing conditions of buildings and reporting such data to the district officer.

The instructions for rat-proofing repairs were prepared in the district office under the supervision of the medical officer in charge of the district, and signed by him. The districts were also assigned a

squad of men for the purpose of fumigating and disinfecting infected premises and for the summary destruction of rodent harborage at the different foci.

At the beginning of the campaign a number of employees who had had experience in plague eradication measures in San Francisco were ordered to New Orleans. Some of them were building inspectors well versed in rat-proofing work, and others were experienced in rat catching. These men acted as instructors to those newly employed in New Orleans, and very materially assisted in the organization of an efficient force of employees for the campaign. Applicants for the position of building inspector were each given a probationary trial under one of these older employees before appointment. Most of the old employees proved themselves to be very faithful and efficient in the discharge of their duties as instructors. All supplies were furnished by headquarters upon the proper requisition, and included blank forms (mimeographed or printed), bait, poison, traps, flash lights, pulicide solution, and miscellaneous articles.

CITY OF NEW ORLEANS.

In combatting the spread of plague the local conditions in the city of New Orleans presented many difficulties. While containing only 375,000 population, the municipality is spread over a very large area, 196 square miles. The city being one of the oldest in the country, had a very large number of buildings in a very poor state of repair, which furnished ample rat harborage. A great deal of property in New Orleans is owned by nonresidents and has been allowed to deteriorate. For the most part the buildings are frame and have been constructed rather close to the ground.

The docks along the river front especially presented a problem in rat proofing. Being located on the banks of a river and subject to varying influences from the current thereof, they have been heretofore of frame construction, part resting on the levee and part overhanging the river. In times past various parts of the wharves have been completely carried away by the force of the stream. The question of rat proofing the wharves was a very serious one, both on account of the engineering problems and the financial expenditure involved. The docks are State property under the supervision of a State commission, the dock board. This body decided that it had not the funds for the rat proofing of the property and that it could not secure the money through any legislative means. Their efforts to cooperate with the service, however, have met with partial success through various steamship companies advancing the money for the reconstruction of some of the wharves. Sanitary Engineer Letton was ordered to New Orleans for the purpose of devising practical means of making the wharves rat proof, and his report was published in the Public Health Reports of February 19, 1915.

EDUCATIONAL CAMPAIGN.

At the beginning of the service activities the support of various civic organizations was solicited, and the request met with hearty cooperation. A citizens' health committee was formed and gave in-

valuable assistance to all the efforts of the service. The various volunteer bodies are too numerous to enumerate, but included the business interests, medical societies, women's organizations, and the city and State boards of health, as well as the entire municipal government.

Meetings were held throughout the city for the purpose of disseminating information as to methods in which the citizens could cooperate. These meetings were addressed by service officers, by various physicians of the city, by business men, and by the different city officials. Most of these lectures were illustrated by stereopticon views provided by the service. Public interest was aroused by this educational feature and the favorable public sentiment resulting therefrom has been of inestimable value in eradication work. Throughout the campaign the municipal press has lent its hearty support. Publicity was the watchword and the progress of infection was given fully and frankly to the public as long as there was human plague. Upon the cessation of human cases some of the papers discontinued the publication of reports of plague rodents, and one of them would frequently advert to "the past epidemic of plague." However, this was not productive of any opposition and was presumably inspired by the desire to avoid undue publicity more than by any prejudice against the continuation of the campaign, as at all times the press counseled the fullest cooperation on the part of the citizens.

The frankness of New Orleans authorities and of the press probably operated more than any other feature in establishing confidence in the neighboring States that every precaution was being exercised to prevent the spread of the disease, and that nothing was being concealed. In addition to the above efforts, the service sent weekly reports to health officers throughout the country as to the progress of eradication measures. All this combined to save the city from any burdensome restrictions and secured a relatively free and unrestricted commerce.

LEGAL ENACTMENTS.

At the commencement of the campaign a conjoint committee of service officers, the attorney for the board of health, Maj. W. L. Hughes, and the superintendent of public health, Dr. W. T. O'Reilly, met and drafted four ordinances, as follows:

Ordinance 17, as amended by Ordinance 21 and superseded by Commission Council Ordinance 2512: This ordinance now requires that all buildings in New Orleans shall be rat proof. It divides buildings into three classes—A, B, and C. Class A comprises buildings used in the preparation, storage, or sale of provisions; Class B all buildings not included in classes A or C, except stables; class C, warehouses and wholesale stores and buildings used in the storage or sale of foodstuffs in hermetically sealed containers. Stables are made the subject of special provisions.

Ordinance 16, as amended by Ordinance 20: This ordinance requires the furnishing of metal, water-tight garbage cans, prescribes the use and care of same, the segregation of garbage from dry trash, and divides the city into districts for the collection of garbage.

Ordinance 14, as amended by Ordinance 22: This ordinance now provides that within certain limits it shall be unlawful to keep rabbits, monkeys, chickens, etc., except in a movable, metallic-bottomed coop, elevated 2 feet from the floor; and outside said limits, except in a coop as aforementioned or in an inclosure surrounded by a concrete or stone wall extending 2 feet below and 6 inches above the surface of the ground.

Ordinance 15, as amended by Ordinance 19 and superseded by Commission Council Ordinance 2513: This ordinance requires vessels to fend off 8 feet and to equip all lines with rat guards. It requires the guarding of gangplanks, prohibits the use of gangplanks except during loading or unloading, requires the lighting of gangplanks when used at night, and provides for the inspection of crated cargo or empty barrels, boxes, etc.

Rat proofing progressed, under the authority of Ordinances 17-21, throughout the campaign up to June, 1915, at which time it was declared unconstitutional because of certain technicalities, more particularly the provision contained herein vesting discretionary powers in the superintendent of public health. This measure was consequently redrafted to conform to the decree of the supreme court and was passed by the commission council. At the same time similar action was taken on Ordinances 15 and 16, which, respectively, provided for the proper fending off and rat guarding of ships lying alongside the New Orleans wharves and the disposal of garbage. Throughout the campaign the service has had the fullest cooperation of the city authorities in enforcing the provisions of these ordinances, and the attorney for the board of health, Maj. W. L. Hughes, has vigorously prosecuted those citizens who refused to comply with the rat-proofing requirements, service officers and inspectors acting as the prosecuting witnesses. A total of 2,204 affidavits up to June have been served against violators of this ordinance. Of this number, 209 were convicted and fined and 880 were dismissed at service request because they had complied or were complying with the requirements of the ordinance at the time their trial was called.

OUTGOING QUARANTINE.

At the beginning of the service operations the strictest measures were enforced to prevent the spread of infection through outbound vessels and freight cars. The ships were required to be properly rat guarded, breasted off, gangways raised at night, and prior to departure were fumigated for the purpose of destruction of rats. At first sulphur fumigation was the only available means of accomplishing this latter procedure. Later the service tug *Neptune* was ordered from Philadelphia for duty at New Orleans, Passed Asst. Surg. Norman Roberts accompanying the vessel for the purpose of supervising the fumigation of vessels with carbon monoxide.

All freight cars outward bound with cargo were required to be rat proof, and a large force of inspectors was employed to see that this provision was carried out. In addition to this, the cars were inspected at the time of loading to prevent the introduction of rodents in the merchandise, to see that the cars were properly sealed upon completion of loading, and that the loading was done only in the day-

time, or if cars were only partially loaded by sundown that they were properly closed throughout the night. All cars in which these precautions were taken were placarded with a service certificate stating that the car had been "inspected and passed as rat free, conditional upon unbroken seal." The number of inspectors ranged from 40 to 85, according to conditions. In this way overland freight moved out of New Orleans without interruption or any embarrassment to commercial interests. With but little interruption, shipping proceeded as formerly.

During the first four or five months certain restrictions were exacted by several foreign countries against vessels sailing from New Orleans, but the strict observance of service requirements on the part of outbound vessels afforded so much protection that maritime commerce was but little inconvenienced. Fumigation of ships bound for Cuban ports had to be performed with hydrocyanic gas, as the Cuban authorities would not accept carbon monoxide treatment of loaded ships because this latter fumigant is not lethal to fleas. The possibility of cargo transmitting infected fleas was considered by the Cuban sanitary authorities to be sufficiently serious as to require a fumigant that is toxic to fleas, and hence hydrocyanic gas was used in the ships bound for Cuba when the nature of the cargo precluded sulphur fumigation.

Assisting Surg. Corput in the supervision of the water-front work at different times were Asst. Surg. F. M. Faget and Acting Asst. Surgs. Layton, Stewart, and Hollis. In addition to this force of officers, lay inspectors were later assigned to duty to patrol the wharves both night and day, to insure the continuous observance of the fending-off ordinance. A special mounted police officer was also detailed for the patrol by the direction of the mayor, and did exceptionally fine work in compelling compliance with Ordinances 15-19.

In addition to outgoing requirements on the river, a station was established on Lake Pontchartrain at West End and Spanish Fort. At these places vessels plying between New Orleans and outside ports were fumigated for the destruction of rats. This fumigation was done by sulphur.

Fumigation of outbound vessels was variously done with sulphur, carbon monoxide, and hydrocyanic-acid gas, and as this was chiefly to facilitate procedure at the port of destination, the expense of the fumigating materials was paid by the steamship companies. From headquarters were issued bills of health, fumigation certificates, and certificates of compliance with outgoing quarantine regulations.

The tabulated operations of outgoing quarantine are as follows:

Carbon-monoxide fumigation:	
Number of vessels fumigated-----	638
Coke consumed, by pounds-----	1, 118, 290
Sulphur fumigation:	
Number of vessels fumigated-----	2, 217
Sulphur consumed, by pounds-----	382, 999
Hydrocyanic-acid gas fumigation:	
Number of vessels fumigated-----	64
Chemicals consumed, by pounds—	
Potassium cyanide-----	5, 375
Sodium carbonate-----	7, 161
Sulphuric acid-----	5, 547

Total number of vessels fumigated.....	2,919
Bills of health issued:	
Clean	1,485
Foul	384
Cars inspected, condition good, permitted to load.....	90,467
Cars inspected, ordered repaired.....	62,054
Total cars inspected.....	152,521
Rodents killed in cars.....	38

LABORATORY.

Asst. Surg. C. L. Williams had charge of the laboratory operations, and was given the fullest cooperation and assistance by Dr. W. H. Seeman, the bacteriologist for the city and State, and Dr. Gomilla. In March, 1915, Passed Asst. Surg. C. W. Chapin succeeded Asst. Surg. Williams in charge of the laboratory.

Rodents were dissected and examined and records kept of the location of each rodent received. A flea survey was accomplished and the various procedures necessary for the confirmation of rodent or human infection were performed. To date there have been received at the laboratory 376,317 rodents, by species, as follows:

Mus norvegicus.....	176,091
Mus alexandrinus.....	8,857
Mus rattus.....	5,353
Mus musculus.....	161,709
Unclassified.....	21,953
Wood rats (<i>Hesperomys palustris</i>).....	911
Putrid, species not determined.....	1,443
Total	376,317

In addition to the above the laboratory reports the receipt of the following additional animals, by species:

Musk rats (<i>Fiber zibethicus</i>).....	1,765
<i>Hesperomys palustris</i> (Wood rat).....	438
Guinea pigs.....	20
Minks (<i>Putoria</i> (<i>Lutreola</i>) <i>vison</i>).....	3
Rabbits (<i>Lepus syriaticus</i>).....	5
O'possums (<i>Didelphys virginiana</i>).....	4
Squirrels (<i>Sciurus carolinensis</i>).....	10
Puppies.....	1
Total	2,246

Total animals received of all species, 378,563.

The total number of infected rodents, by species, are as follows:

Mus norvegicus.....	216
Mus alexandrinus.....	8
Mus rattus.....	16
Mus musculus.....	4

Frequency of "suspicious" lesions noted in plague-infected rodents:

Buboes:	
Cervical only.....	44
Axillary only.....	7
Inguinal only.....	34
Multiple only.....	88
Subcutaneous congestion.....	223

Granular liver	135
Granular spleen	8
Pleural effusion	147
Peritoneal effusion	1
Adhesions of the liver	1
Adhesions of the spleen	1
No lesions	9
Number of rodents in which lesions were suggestive of acute plague	230
Number of rodents in which lesions were suggestive of resolving (recovered) plague	5
Number of plague rodents presenting no lesions	9

From the foregoing it may be noted that in order of frequency the plague lesions observed were subcutaneous infection, bubo, pleural effusion, and granular liver.

A considerable number of rats not plague infected were observed with pleural effusion. This was especially noted among a number of rodents taken from a single ship as the result of fumigation. It seemed probable that this condition was due to an infection of the hemorrhagic septicæmic type. A very large number of rodents presented at autopsy adhesions between the various abdominal viscera, but of these only five were found to be plague infected.

FLEA SURVEY.

The flea infestation of New Orleans has been of interest not only for the seasonal fluctuation in general but on account of the variation in the infestation of the different species of rodents. From July 21, 1914, to July 1, 1915, 1,699 live *Norvegicus* were examined for fleas. Only 23 live *Mus rattus* and *Mus alexandrinus* were examined, as these species are notoriously trap shy. No marked variation was noted as to the flea infestation of the different species.

The species of fleas found on rats in New Orleans were *X. cheopis*, *C. fasciatus*, *P. irritans* (few), *T. musculi* and *Ct. canis* and *felis* (few). The table, on page 227, shows the average number of fleas per rat by weeks on *M. norvegicus*, *alexandrinus*, and *rattus*. Only *X. cheopis* and *C. fasciatus* are tabulated, as the other species were rare.

X. cheopis.—It will be noted that the *X. cheopis* was most prevalent in the hot weather, reaching a maximum weekly average of 18 per rat in August, 1914, 10 in September, and 10 in June, 1915. From November, 1914, to April, 1915, inclusive, the number of *X. cheopis* averaged about 1 flea per rat. A large number of live rats examined were free of fleas, but an occasional rodent would be heavily infested. Asst. Surg. C. L. Williams, in the month of September, 1914, collected 391 *X. cheopis* from a *Mus norvegicus*. The rat subsequently proved to be plague infected. A few *X. cheopis* were found on muskrats. Three of this species were secured on a total of 18 live muskrats. The *X. cheopis* were occasionally obtained on wood rats. As during July, August, and September, the *X. cheopis* was practically the only species of flea found on rats, it was presumably the species chiefly involved in the spread of plague during this period of time.

As the subsidence of flea infestation was coordinate with the reduction of rodent population, it was not possible to say which element most influenced the decline in the infection. It would seem probable

that the diminution of the rodent population has been the chief factor, inasmuch as the flea infestation has again risen in May and June of 1915 without the reappearance of human plague or any material increase of rodent plague, notwithstanding there still remained some infection in New Orleans during these months.

C. fasciatus.—This species was at no period very numerous. It was found on rats oftener in the cold months than in hot weather. It was not obtained at all during July and August, nor in September of 1914, first appearing in October. In the latter part of February this species was found to barely exceed one flea per rat, but generally the infestation of rats by the *C. fasciatus* was a rarity.

P. irritans.—This species of flea was not often discovered on rats. Among 1,699 *Mus norvegicus* examined there were found 240 *P. irritans*, 96 of this number being on one rodent.

Ct. musculi (Mouse flea).—This species at no time was abundant on rats. Mice were not examined. It was found on all species of rats and generally was confined to the head and neck of its host, in contrast to the stronger species of fleas that invaded the entire cutaneous area of the rat. This species was predominant on the *Mus alexandrinus* and *rattus*, possibly because of the association of the rats with mice within buildings. On all species of rats the infestation of *Ct. musculi* in New Orleans exceeded that of the *C. fasciatus*.

C. canis and felis.—These species were found on rats, but never were very prevalent.

The live rats examined and fleas found are as follows:

Total number of <i>Mus norvegicus</i> examined.....	1, 699
Fleas found	4, 335
<i>X. cheopis</i>	2, 700
<i>C. fasciatus</i>	553
<i>P. irritans</i>	240
<i>C. canis</i>	102
<i>C. musculus</i>	740
Total number of <i>Mus alexandrinus</i> examined.....	17
Fleas found	101
<i>X. cheopis</i>	33
<i>C. fasciatus</i>	3
<i>C. musculi</i>	65
Total number of <i>Mus rattus</i> examined.....	6
Fleas found	21
<i>X. cheopis</i>	6
<i>C. fasciatus</i>	3
<i>C. musculi</i>	12
Total number of wood rats examined (3 species).....	32
Fleas found	20
<i>X. cheopis</i>	20
Total number of musk rats examined.....	18
Fleas found	4
<i>X. cheopis</i>	3
<i>C. musculi</i>	1

Flea infestation of rats (average number of fleas per rat).

Week ending—	Mus norvegicus.		Mus rattus and alexandrinus.	
	X. cheopis.	C. fasciatus.	X. cheopis.	C. fasciatus.
1914.				
July 25.....	3.7		12	
Aug. 1.....	18			
Aug. 8.....	7			
Aug. 15 ¹	2			
Aug. 22.....	3.3		6	
Aug. 29.....	3.6		3	
Sept. 5.....	3			
Sept. 12.....	10			
Sept. 19.....	3			
Sept. 26.....	2		11	
Oct. 3.....	1.2	.012		
Oct. 10 ²	1.6	.17		
Oct. 17 ³	3	.18		
Oct. 24.....	2	.04		
Oct. 31 ⁴.....	.2	.23		
Nov. 7.....	1.3	.18		
Nov. 14.....				
Nov. 21 ¹				
Nov. 28.....	.9	.7		
Dec. 5.....	1.5	.7	.5	
Dec. 12.....	2	.05		
Dec. 19.....	.6		2	
Dec. 26.....	1	.05		
1915.				
Jan. 2.....	.09	.09		
Jan. 9.....	.9	.3		
Jan. 16.....	1.5	.06	1	
Jan. 23.....	.68	.15		
Jan. 30.....	1.2	.86		
Feb. 6.....	.5			
Feb. 13.....	.07		1	1
Feb. 20.....	1	1.2		
Feb. 27.....	1.5	2.5		
Mar. 6.....	.75	.17		
Mar. 13.....	.7	.41		
Mar. 20.....	1			
Mar. 27.....	.7	.9		
Apr. 3.....	.07	.6		
Apr. 10.....	.4	.5		
Apr. 17.....	.25	.71		
Apr. 24.....	.14	.5		
May 1.....	.48	.48	.5	1.5
May 8.....	.5	.5		
May 15.....	1.3	.45		
May 22.....	6	.2	.5	
May 29.....	1.3			
June 5.....	2	.2		
June 12.....	10			
June 19.....	9			
June 26.....				

¹ No rats examined.² 1 on 83 rats.³ 1 on 54 rats.⁴ 2 on 48 rats.

EPIZOOTIC.

The first plague-infected rat discovered in New Orleans was that trapped on July 11, 1914, at 1904 Magazine Street. This rodent was a *Mus norvegicus*, and was captured from a shed in the rear yard of a tea and coffee shop. Throughout the fiscal year there have been captured 244 plague-infected rodents. The last plague rodent to date was that captured on June 14, 1915, at 1900 Constance Street. It was a *Mus norvegicus*.

It is questionable whether there will be other sporadic cases of rodent plague discovered in the future. If not, then the infection in New Orleans may be said to have persisted for the period of one

year, although had the standard of human case incidence been observed (as, unfortunately, is the custom in some countries) the infection would have been declared eradicated three months after the inauguration of the campaign. Chart 2 gives the percentage of infection by months. Since October, 1914, the infection has not exceeded 0.1 per cent, falling to almost nil during the past four months. Chart 1 shows the relation between the decline in rodent plague and the reduction of rodent population.

Many of these were solitary cases, but at a few foci a large number of rats were taken. The location of infected rats was indicated on a map and numbered in sequence, regardless of the number of plague-infected rodents taken therefrom. It is not to be considered, however, that the infection actually occurred in the various sections of New Orleans in such order of sequence, for the trapping or finding of a plague-infected rat is largely accidental, and it is probable that a number of infected rats were never discovered, dying in obscure places or being so putrid at the time of discovery that laboratory diagnosis was not possible. As an illustration of the difficulty in trying to trace the progress of infection by reference to the foci, foci 79 and 16 may be cited as a case in point. Focus 16 was located much farther from the site of the original infection than was focus 79. It is, therefore, questionable whether the infection passed over the site of focus 79 out to focus 16, the infection at focus 79 subsequently developing, or whether both foci were coexistent, the latter remaining undiscovered by reason of irregular trapping results. However, early in the campaign it was demonstrated that the entire river front was infected, rodent case No. 6 being taken from the Dumaine Street Wharf on July 15, rodent case No. 13 from Stuyvesant Docks on July 21, and various others at short intervals of time from intermediate points along the wharves. Radiating from the focus of rodent case No. 1, rodent and human infection was fairly well confined in July and August to the central district of the city, including that contiguous to the wharves. Intensive trapping was practiced throughout these months, and it seems safe to assume that the extent of the infection was accurately mapped. Louisiana on the west, Claiborne on the north, Elysian Fields on the east, and the river on the fourth side were the boundaries of this territory, excepting only the focus at Stuyvesant Docks, on the river just above Louisiana Avenue.

Subsequent to September 1, 1914, the infection spread over and beyond these boundaries, plague foci appearing progressively and symmetrically in a radiating zone to a maximum distance of 2 miles beyond, rodent case No. 201 (focus 98), trapped on November 25, being that distance from Claiborne Avenue, the limitation of infection on September 1.

Rodent foci 78, 81, 94, and 99 in the eastern outskirts of the city appeared at varying intervals of time during September and October and in a sparsely settled district almost a mile from any previously known plague case. With the exception of focus 94, these rats were trapped on vacant lots and were clearly all cases of plague extension by migration.

Infected rat 206 (focus 103) was caught on November 30, on an open lot, $1\frac{1}{2}$ miles distant from any other known case of rodent or

CHART 1.—U. S. Public Health Service. Average daily rat catch by weeks, New Orleans, La.

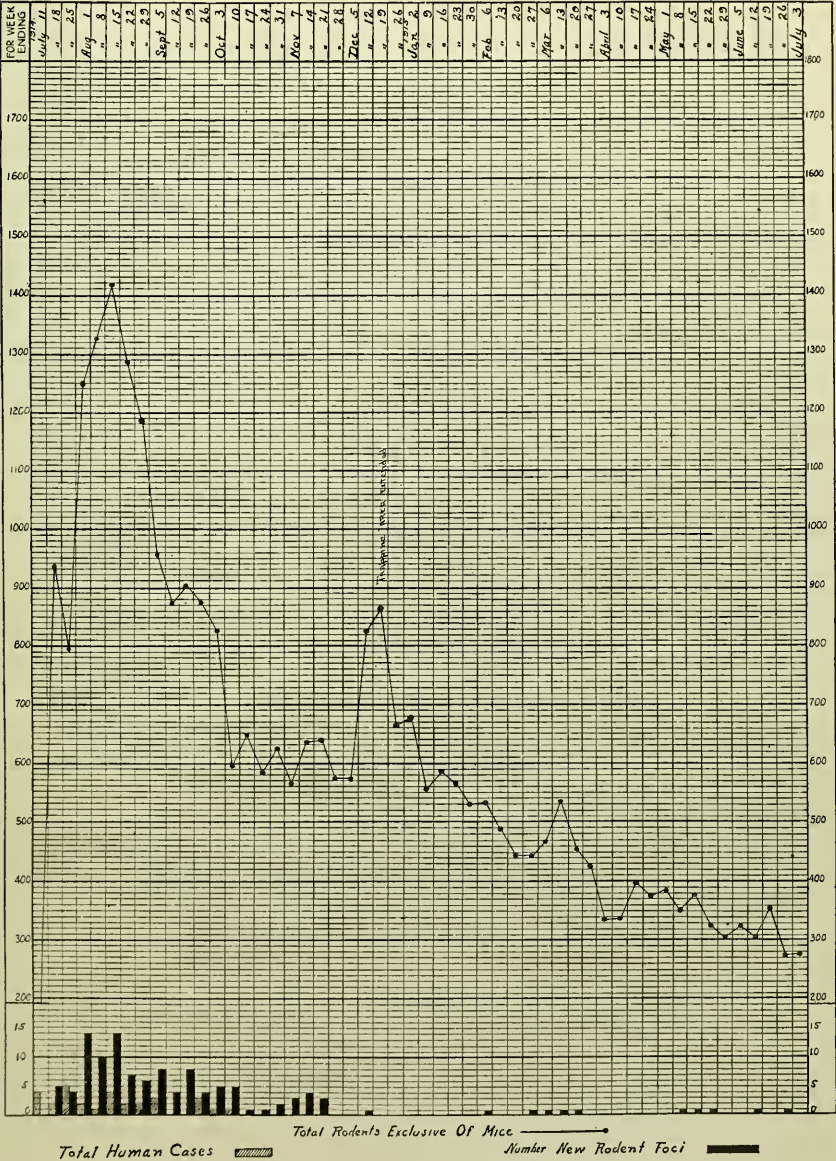
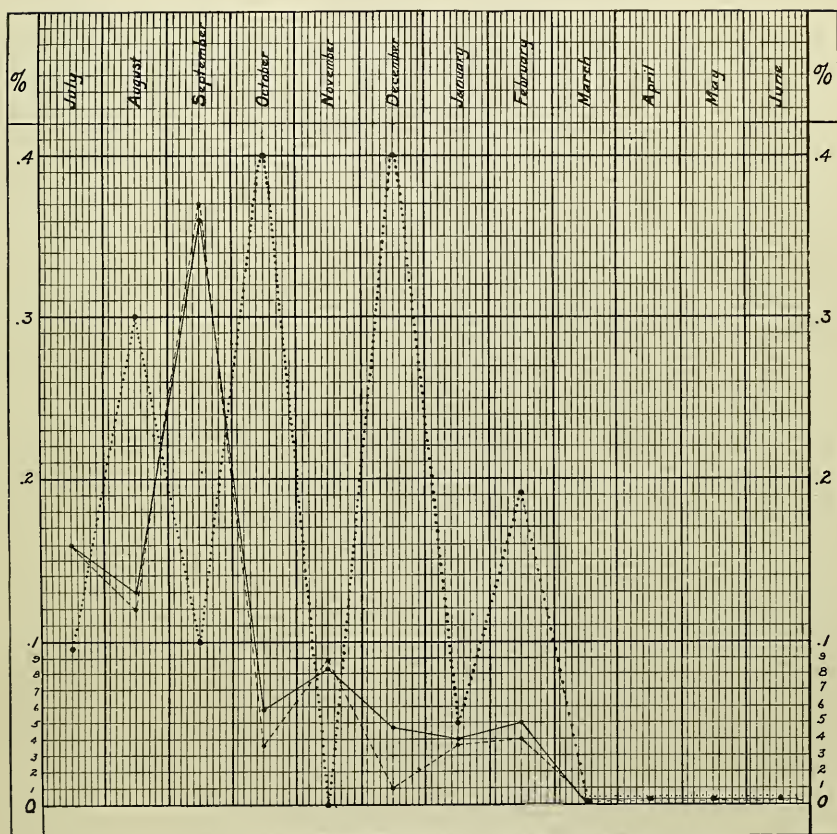


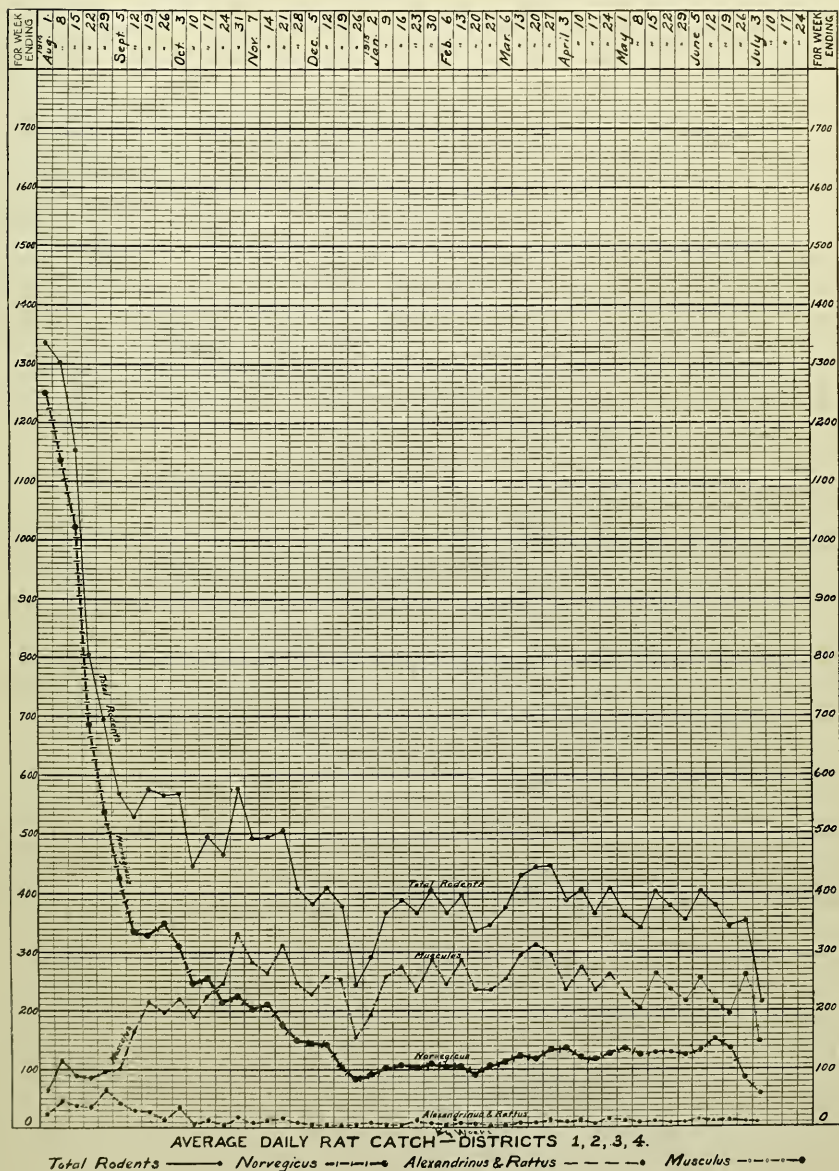
CHART 2.—U. S. Public Health Service, New Orleans, La.



AVERAGE PERCENTAGE RODENT INFECTION

Total Rodents ——— Norvegicus - - - - - Alexandrinus & Rattus

CHART 3.—U. S. Public Health Service, New Orleans, La.



hun in plague. From an epidemiologic study of the epizootic it seemed very apparent that the dissemination of plague throughout the city was due to the migration of rats, but as this mode of the intraurban spread of plague has as yet not found common acceptance among sanitary authorities in general, an experiment was performed in the latter part of March to determine the facts regarding intraurban travel of rodents. The result of this experiment was published in the Public Health Reports of June 4, 1915, and has clearly established the probability of the extension of plague through widespread travels of rats. From first to last the rodent plague infection in New Orleans has covered an irregular area of about 50 square miles, exclusive of the focus at Westwego.

One case of rodent plague was found across the river in the town of Westwego. The rodent was discovered dead on a dump where refuse from empty cars was thrown. One of the railroad companies was accustomed to send empty cars to this place for cleaning. It seemed most probable that the rat was transferred from the city in one of these empty cars. This was a case of resolving plague and no subsequent infection developed.

INFECTION OF DIFFERENT SPECIES OF RATS.

The first infected rats were *M. norvegicus*. It was not until August 1, 1914, that an infected *M. rattus* was taken. It has been generally assumed that infection among Norway rats occurs first and that the infection among the roof rats (both the *M. rattus* and *M. alexandrinus*) follows subsequently and at a fixed interval of time, generally about 10 days, according to the English observers in India. This generalization, however, seems illogical, because there are too many variable factors to fix any definite interval of time between the infection of the two species or to designate which species may become infected first. As rodent infection is chiefly disseminated by migratory rodents, it is natural that the infection will more often appear in that species whose habitat is on the ground area. However, at focus 57 infection of *M. rattus* was discovered several days before an infected *M. norvegicus* was found. In other foci the two species were found to be infected, the *norvegicus* infection preceding the *rattus* infection. At focus No. 82, the first infected *norvegicus* was discovered on September 25, the first infected *rattus* on October 12. On the discovery of infection at this place the *norvegicus* were wholly destroyed by the summary destruction of the harborage, supplemented by clubbing. The *M. rattus* which were harboring on the upper floor were noticed several days afterwards to be openly descending to the ground floor for food and water, and they presumably acquired infection in this way, picking up infected fleas which had been dispossessed from the infected Norway rats and which had remained undestroyed by the treatment of the premises with pulecide solution. Several days after the destruction of the *rattus* population an infected *musculus* (mouse) was found. At focus No. 13 the first infected *norvegicus* was trapped on July 23, and the first *rattus* on September 23. Several months subsequent and after the two larger species had been destroyed, three infected mice were obtained.

Chart 2 indicates the percentage of infection of the various species according to months. The *Mus rattus* and *alexandrinus* are combined on account of the similarity of their habits, both being roof and upper-story rats, in contradistinction to the Norway rat, which frequents ground areas. These contrasted percentages can not be accepted on their face value, because the number of captured roof rats was disproportionately small in comparison to the *norvegicus* catch. A large number of infected Norway rats, because of their burrowing habits, die in hidden places beneath the floors and in burrows, and are not found, and the *M. rattus* and *M. alexandrinus* often die in open, exposed places and are discovered.

Of the infected rodents, 49 were found dead and 195 were captured, either by trapping or killing. As a result of summary destruction of rodent harborage, 30 infected *M. norvegicus* were found dead, 11 *M. rattus*, 6 *M. alexandrinus*, and 2 *M. musculus*. From this it will be seen that the dead roof rats are found much more often than are dead Norway rats. Aside from the above factor, the *Mus rattus* and *Mus alexandrinus* are both more wary of traps than is the *Mus norvegicus*. A large number of rats arrived at the laboratory too putrid for examination. Had their condition made examination possible, the percentage would probably have been increased.

SOURCE OF INFECTION.

Infected rats came from the following character of buildings:

Dwelling	66
Sewers	2
Open sheds	11
Food depots	60
Wharves	39
Stables	45
Open areas	12
Business establishments	9

Of the number recorded from dwellings, infected rodents were variously captured from the interior of the building, beneath the structure, beneath floors, from rear sheds, or from temporary harborage, as piles of lumber or débris. Of those listed from food depots, the majority were taken from the interior of buildings, as were likewise rats from stables. Infected rodents were generally found in those locations that afforded most attractive harborage and food supply. While most of these places were not kept in an orderly manner, they could not be classified as filthy. In fact, there was nothing in the progress of rodent or human infection in New Orleans to support the popular idea that plague is a filth disease. The gutters and sewers of the city were comparatively free of rodent population. The premises from which infected rats were taken and in which human plague occurred were, on the whole, about the average in mechanical cleanliness and general appearance, some of them being especially clean and well kept.

TENACITY OF THE INFECTION.

All foci were vigorously treated at the first appearance of infection by summary removal of rodent harborage, initiation of rat proofing,

and intensive trapping. In general, these procedures sufficed to completely remove all traces of infection from the premises so treated.

Several foci, however, have retained infection for varying intervals of time, due in most cases to the oversight of some remaining harborage. Focus No. 82 remained infected 20 days, including epizootic among *Mus norvegicus*, *Mus rattus*, and *Mus musculus*. Rodent focus No. 57 retained infection for 6 days, after which time no subsequent infection was found. Eradication results were confirmed by guinea pig controls. Focus No. 13 retained infection for a period of 8 months. Intervals of a month or more would occur between the capture of infected rats at this place. This was due to the fact, however, that obscure harborage for the *rattus* and *alexandrinus* remained undiscovered despite careful investigation. This occurred at the Stuyvesant Docks, a structure a mile in length, variously spaced by defective (from a rat-proofing standpoint) fire walls, with a reinforced concrete roof. It was finally discovered that *Mus rattus* and *alexandrinus* were harboring in the roof beneath the vitrified coping that capped the top of the fire wall and beneath the metallic "flashing" that protected the junction of the concrete roof and fire wall. An expansion joint was maintained at the junction of the wall and roof, and this space was protected from the weather (rain) by copper sheeting, which formed a triangular space, affording an ideal harborage for roof rats. Several infected rats were found upon removal of the coping and flashing. Subsequent to the removal of this harborage on the roof no infected rats have been discovered at focus 13, during the past six months, and it seems probable that the infection at the Stuyvesant Docks has been definitely destroyed. Had this obscure harborage not been detected, it seems apparent that the infection might have persisted at that location for an indefinite period of time.

QUIESCENT RODENT PLAGUE.

On account of the eradivative measures adopted at various foci of infection there were but few opportunities to observe the latency of rodent plague in any one premises. At focus 28, however (wharf on the river front, where rat proofing was not carried into effect), the first infected rat was trapped on July 28, the second August 4, and then followed an interval of 51 days before the trapping of the third infected rat on September 24. At focus 13, another wharf, intervals from one to two months occurred between the capture of infected rodents. During these periods in which no plague was discovered there was intensive trapping at both places, and a large number of rats captured from each focus, but with the above-mentioned exceptions none of the rats were infected.

Observations on quiescent rodent plague, however, were chiefly made in circumscribed localities. At focus No. 86, plague rat No. 174 was captured on September 26, and on February 21 plague rodent No. 233. Rodent No. 107 was captured beneath a vacant dwelling located diagonally across the street from site of focus No. 86. During an interval of five months no infected rats had been discovered within a radius of one-half mile, despite the trapping of a very large number of rodents. It seemed evident that the infection may have re-

mained in the near vicinity, presumably being a case of resolving plague, not, however, case 233, which had an acute infection. Rodent No. 235 was trapped on February 20, within one-half block of rodent case No. 194, captured on November 17, an interval of more than three months. No plague rat had been taken during this time within a distance of 1 mile. Rodent case 235 was one of resolving plague, and the infection had apparently remained latent and undiscovered in this area despite intensive trapping.

On April 24 an infected rat was taken from a vacant building at the corner of Royal and St. Roch Streets. In the preceding five months no rodent infection had been discovered within 2 miles of this location, although intensive trapping had been in force throughout this period of time. Infected rat No. 244 was trapped on June 14, at 1900 Constance Street, within one block of rodent case No. 1, trapped 11 months earlier. During the preceding four months there had not been an infected rodent captured within a distance of 2 miles from this focus. These are illustrations of the fallacy of assuming no infection in an area because of barren trapping results covering limited periods of time. It is this mysterious, only partly understood bridge that retains infection in a dormant, unrecognizable form for several months in a circumscribed area that is the really great problem of plague eradication. Some form of chronic or resolving plague may be the underlying cause, but it is difficult to understand the persistence of this reservoir of infection despite intensive trapping.

It is possible that plague-infected rodents captured from such an area and sent to the laboratory may evidence so few signs of plague, or none at all, as to pass undiagnosed by the bacteriologist. Had it not been for the unusual circumstances surrounding the discovery of rodent case No. 237, taken on July 24, on the corner of St. Roch and Royal Streets, this rat would probably have been passed in the routine examination without a diagnosis of plague being made. The suspicious circumstances alluded to were that the rat was found moribund and that a previous rat had been found in the same place in a putrid condition, and in addition the premises were very heavily flea infested. The rodent was sent to the laboratory and was most carefully inspected by Passed Asst. Surg. C. W. Chapin, who reported that there was no lesion indicating a suspicion of the disease; not even an adhesion which is often noticed in rats with resolving plague. Because of the unusual condition a guinea pig was inoculated with the tissue of this rat. The pig subsequently died of plague. This could not have been a condition of resolving plague, because the rodent was actually dying at the time of discovery, and notwithstanding the fact that there was no bubo, no pleural effusion, no subcutaneous injection or visceral changes of any nature whatsoever, it seems evident that the rat had acute plague. Subsequently four other rats were killed on the premises. These animals were likewise negative for any evidence of plague, yet when their tissues were inoculated into a guinea pig, the pig died of the disease.

THE INTERRELATION OF RODENT AND HUMAN PLAGUE.

It is of interest to note, first, evidence of any association between the human case of plague and rodent plague; second, the occurrence

of human plague at the various rodent-plague foci. As will be noted from the table of human plague cases, there were several instances where circumstantial evidence was adduced of intimate contact between a human case of plague and dead rodents, and other instances where rodent plague preceded a human case on the premises. Direct and incriminating evidence, however, was generally lacking. Human case No. 24 is a fair example of the obscure circumstances which surround the infection of a human case at the time of its discovery. No plague rats had ever been taken from the premises or from the surrounding territory, nor was there obtainable any history of dead rats upon the premises. Subsequent to the recovery of the patient, however, an investigation revealed the fact that the child had been playing in the rear yard two or three days previous to the illness and had picked up a dead rat and thrown it into the garbage can. The patient's bubo was in the groin, so the actual handling of the rat was not responsible for the infection, for otherwise the bubo would have been in the axilla, the result of flea bites in the upper extremity. It seemed most probable that the infected fleas had been dispersed from the rat and that the child had been bitten in the lower extremity while playing in the yard. Had the rat died beneath rubbish or otherwise passed unnoticed the circumstances attending the infection would hardly have been different except for the lack of any presumptive evidence as to the manner of infection.

In all there were taken 244 infected rodents from 116 foci. With the exception of human case 14, no cases of rodent and human plague were synchronously detected upon the same premises. In several instances rodent plague preceded human plague, either on the same property or on the adjoining premises. Solitary cases of rodent plague were the general rule. There were several foci, however, from which a comparatively large number of infected rats were taken.

At focus No. 75, 35 infected rats were taken and at focus No. 82, 36 infected rats were secured. At focus No. 57, 10 infected rats were obtained. Despite the very heavy infection at these three foci, no human cases of plague occurred, chiefly for the reason that the infection was discovered fairly early and eradication measures immediately applied. For the most part, human plague did not follow the discovery of rodent plague. This apparent inconsistency has a plausible explanation in the selective habits of the rat fleas. *Cheopis* and *fasciatus* select the rat as their normal host and have shown a marked preference for it. As long as their natural host is available the rat fleas will usually adhere to it instead of attacking man. Surg. Creel expresses the view that it is the solitary infected rodent, either a migratory one or the last of a colony, that causes human infection. The dispersed fleas, unable to find an available rodent, through necessity feed upon a less preferred host, as man or other animals. The dead rat may pass unnoticed beneath some obscure covert, may be thrown into the garbage pail, burned, or otherwise disposed of and the instance forgotten, unless a human case of plague shortly thereafter serves to attach some importance to the incident.

At rodent foci 57, 72, and 82 there was still a large rat population at the time of the discovery of the infection. In addition to the 35 infected rats taken at focus No. 82, some 83 live noninfected rats were

captured, and at focus No. 72, in addition to the infected rats, there were captured 42 live noninfected rodents. In both of these places it was evident that there still remained an abundance of live rats to accommodate any infected fleas cast off from dead rats, and there was no necessity for these parasites to seek other than their natural and preferred host. Had the epizootic followed its natural course at these foci there might have come a time when, lacking available rodent hosts, the fleas would have attacked human inmates within the building.

TREATMENT OF FOCI.

Upon the discovery of human plague the measures employed consisted of a fumigation of the infected building by sulphur, spraying of the entire premises with a 2 per cent solution of coal-oil emulsion to destroy fleas, and intensive rat trapping. Rat proofing of the premises was secured at the earliest possible date. The fumigation was chiefly practiced as a precaution to kill any dispersed infected fleas, but was not considered an effective eradicated measure. The ineffectiveness of fumigating buildings for the destruction of rats was amply demonstrated in several rodent foci, notably at 160 South Rampart Street and 1013 Magazine. In both of these buildings sulphur fumigation was practiced as thoroughly as possible. When the flooring of the buildings was removed just subsequent to the fumigation many live rats were captured, and those that were found dead were proven to be plague infected. It seemed evident that the fumigation had no effect on the rodents harboring beneath the floors or in the walls. While the fumigation of human foci was continued in a routine way, this procedure was discarded in the treatment of rodent foci after the first month or two of the campaign.

Splendid results were obtained in various foci by the immediate removal of rodent harborage. This procedure is the most logical and valuable of all eradicated measures. It has undoubtedly been the one measure most operative to the early control and suppression of the infection. In the immediate destruction of rodent harborage at 160 South Rampart Street, 77 rats were captured, 35 of them being infected. Despite intensive trapping, only an occasional rat had been trapped at this place at the date of discovery of the infection. Had the owner been permitted to proceed at a leisurely rate of progress in effecting the rat proofing, unquestionably a large number of the infected rats would have escaped to other parts, transplanting thereat a fresh focus of infection, and human infection at 160 South Rampart Street would doubtlessly have followed at a later date. The live rats still remaining under the flooring presumably accommodated all fleas and thereby protected the human inmates from their attack. Later on, with the decline in available rodent hosts, the fleas would probably have attacked the people within the building.

At 1013 Magazine Street 103 rats were captured in the same manner. Of these 35 were found to be infected. In the summary destruction of rodent harborage it is seldom necessary to seriously dismantle the building, the removal of the floor covering, leaving the walls and roof intact, being all that is necessary, unless there are double walls that harbor rats. In this latter event the inner wall must be removed. In harboring beneath flooring rats generally make

burrows a foot or more in depth. It is necessary to thoroughly examine the ground for such openings, and if they exist the earth should be spaded, following the ramifications of each burrow, and the entire area then sprayed with a pulecide solution. Any outhouses or other structures on the premises, as well as the infected buildings, should be so treated and all movable rat harborages well elevated. Immediately following this procedure on the infected premises mentioned, intensive trapping was instituted and rat proofing of the remainder of the block was pushed as rapidly as possible.

TRAPPING.

The elimination of plague infection is ultimately due to the diminution of the rodent population, and though rat proofing is a most valuable adjunctive measure and in some localities may be an indispensable procedure, an efficient trapping force is of the utmost importance in an antiplague campaign. The delineation of infected areas and the destruction of rats are alike dependent upon the effectiveness of the trappers.

The organization of this part of the field force in New Orleans was patterned after service methods used in former campaigns. A squad of four to six men, under the immediate charge of a foreman, was the unit. The number of squads apportioned to each sanitary district depended upon the character of the district. In each district was a supervising inspector, who had charge of the trapping force. The foreman saw to it that the trappers were on duty during working hours, that the traps were properly placed, baited, and kept in good condition. He held the trapper to a proper accounting of service property and ascertained that trappers were carefully and legibly tagging each rodent. In addition to these duties the foreman kept a record of the daily rat catch of his squad and advised trappers as to rat-catching methods.

The duty of the supervising inspector of trappers includes checking up the trappers and the work of the foremen, adjusting troubles between trappers and property owners, maintaining discipline in the trapping force, and attending to such miscellaneous duties relative to trapping as the district officer directs from time to time.

The maximum number of trappers was employed during the first two months of the epidemic, not only for the purpose of effecting the earliest possible reduction in the rodent population, but also for the immediate delineation of the infected zones. The greatest force at any one time was 320 trappers and 60 foremen, during the latter part of August. Subsequent to October, and especially in the last six months, there has been a very material curtailment of the force of men, partly due to the lessened rat population and the decline in rodent infection, and also because as the men became more efficient the same work could be done with a smaller force than formerly. At the end of the fiscal year the trapping force was comprised of 179 trappers, 35 foremen, and 7 supervising inspectors.

Both snap traps and cages were used. A reliable estimate of the comparative value of these patterns is difficult. It is a very unusual trapper that will bestow equal care in placing, baiting, and changing the snaps and cages, for the former are small and easily handled,

whereas the latter are cumbersome and require considerably more trouble in placing, baiting, and keeping them in order. Properly attended cage traps are preferable in those places having a large number of rats, but when the rodent population becomes diminished and well distributed an equal amount of labor produces better results with snap traps. Cages, then, are most effective at the initiation of an antirrat campaign—snap traps more effective later on. This does not apply to the *Mus rattus* and *Mus alexandrinus*, species that are notoriously trap shy, and are best captured in snap traps.

Up to June 30, 1915, there have been used 56,808 snap traps and 5,796 cages. At present the trapping force is using 30,121 snaps and 3,147 cages, an average per man of 170 snaps and 17 cages.

When assigned to duty, trappers are required to sign a receipt for traps and other property intrusted to their care, with an agreement as to their accountability therefor. If the traps are lost through carelessness the employee has to replace the property, but if the traps are stolen he is relieved of the responsibility. At first there was a considerable loss as a result of petty thievery, but later on, and especially after the snap traps were branded "U. S. Gov't. Property," this character of loss became less.

Bacon was the bait chiefly used, especially for snap traps. The cost of bacon for so many traps was a matter of considerable importance and was given study and attention. At first a cheap grade of fat bacon was used, costing 13 cents per pound, but later a grade of bacon costing $16\frac{3}{4}$ cents per pound was found to be more economical.

At the beginning, trappers were paid on a flat salary basis of \$2 per day. In the third month of trapping the decline in rats was so marked that a change of compensation was inaugurated, the men being paid \$1.75 per day and a bounty of 10 cents for each rat, with an additional bonus of \$5 for each infected rodent. This plan not only resulted in a saving of money to the Government but it stimulated the rat catchers, created an automatic standard, provided a premium for the more efficient trappers, with corresponding decreased pay for the less efficient. The rat catch had been dropping at a rate of 200 rats per week prior to the institution of the bounty plan. Immediately following the change of compensation the drop in the rat catch stopped; indeed, for four weeks afterwards there was a slight increase, followed by a gradual decrease as the rats became more scarce. It is believed that this method of a combined salary with an additional bounty is the best means of establishing an automatic standard of catch (for some standard of efficiency is necessary) without furnishing any considerable incentive to trappers for the importation of rats.

Care has to be observed, however, to prevent the latter contingency, no matter what the value of compensation may be. The results sought in trapping are efficiency, economy, and a maximum rat catch. The combined remuneration of salary plus bounty seems to obtain the desired end more effectively than any other method.

During July and August, 1914, the daily rat catch ran high, but a decline commenced in August and continued. The maximum daily rat catch (exclusive of mice) was 1,708 on July 29. On October 1, the date of the last case of human plague, the rat catch had fallen to 737. In June, 1915, the daily rat catch (exclusive of mice) averaged

about 300 per day. During July and the early part of August trapping was confined to the area between the river and Claiborne Avenue and from Esplanade to Louisiana Avenue, but subsequently these boundaries were extended so as to include all of New Orleans. Owing to this expansion of trapping area no comparison can be made as to trapping results of July, 1914, and June, 1915, for the entire city, but Chart 3 shows the progress of trapping in the central area of the city, which has been trapped over in a uniform manner from the start of the campaign to the present time. The decrease in *M. norvegicus* and the increase in *M. musculus* (mice) is very notable.

Chart 1 shows the trapping results for the whole city, but no comparisons can be made from this chart because of the extension of trapping area. The averaging of the daily catch by weeks eliminates misleading fluctuations due to rainy days, Sundays, holidays, etc. The variation in the daily catch of *Mus rattus* (black rat) and *Mus alexandrinus* (roof rat) have not been marked, the catch of these species being relatively low at all times.

The variations of the *Mus norvegicus* and the *Mus musculus* have been remarkable. On July 29 there were only 176 *Mus musculus* (mice) caught, in contrast to 1636 *Mus norvegicus* (Norway), but throughout the year there has been a steady increase of the former species (mice) proportionate to the decrease of the Norway rat. The mouse curve and the rat curve crossed, the rat catch diminishing and the mouse catch increasing, so that on March 27, for instance, there were trapped 537 mice in comparison to 313 Norway rats. The rat curve and the mouse curve have oscillated, but since November the mouse catch has at all times exceeded the rat catch. On June 30 the mouse catch was 587, the rat catch 294.

During the months November to March a large number of wood rats (three species) were trapped in the rural districts about New Orleans, but as it became evident that there was no infection among the different species the trapping was discontinued. The muskrats were caught on the outskirts of the city.

The total rat catch, by species, for the fiscal year ended June 30, 1915, is as follows:

<i>Mus norvegicus</i>	206, 137
<i>Mus rattus</i>	7, 357
<i>Mus alexandrinus</i>	8, 704
<i>Mus musculus</i>	154, 988
Unclassified	2, 401
Total	379, 587

Throughout the campaign the trapping force proved to be highly efficient. Aside from the evident reduction in rodent population, a further index was furnished in the performance of an experiment during April and May to determine the extent of rodent migration. Of a total of 179 rats liberated in the latter part of March there were 103 recaptured within one month.

The sewers and gutters of New Orleans are but slightly rat infested, although the planked-over culverts within the city are used as runways by foraging rodents. A special trapping force was selected for working the sewers and culverts, but their efforts met with but

small success, and these squads were discontinued, the trapping of sewers and culverts being resumed by the general trapping force. Effective rat proofing was the probable factor most influencing trapping.

GARBAGE DISPOSAL.

The collection and disposition of garbage in New Orleans prior to the campaign was far from satisfactory. The maintenance of garbage dumps throughout the city was the method of disposal. As the collection force was inadequate for the large expanse of territory, the difficulty of long hauls was partially met by locating the site of dumping as near as possible to the collection area, quite often in the midst of a thickly settled district. A part of the garbage was placed in cars and hauled some distance from the city, but in spite of this there were many intraurban garbage dumps. The necessity for filling in some of the city property has also been an incentive for the continuation of dumping.

In the commencement of the campaign tentative plans were made for disposal by incineration. Investigations have been made by the city authorities as to the most available method of garbage disposal, and a small incinerating plant has for several months been in operation, testing the composition of the garbage. Definite plans for the disposal of garbage in New Orleans are still undetermined. To meet the emergency, however, the collection system has been very much improved, and the scavenger force has been enlarged. Some of the dumps have been abandoned and at others garbage incineration has been performed in a crude sort of way by surface combustion, aided by oil. The garbage disposal of New Orleans at present, however, is far from satisfactory. Service operations have resulted in the installation of garbage cans throughout the city. Formerly open wooden barrels, boxes, and miscellaneous containers were common.

RAT PROOFING.

Although there were many obstacles to be overcome in the general campaign of rat proofing, there was no special technical problem in the prospective work except that of the wharves along the river.

Coincident with the start of the work, however, there occurred in New Orleans a financial and business depression which was due to various causes—the European war, the slump in the price of cotton, and to a certain extent the presence of plague—and this condition made rat proofing a greater hardship on property owners than otherwise would have been the case. In addition, New Orleans is an old city, and age has left its mark on many structures, with the result that there were numerous buildings in a sadly dilapidated state. This was especially so in those quarters where the poorer classes lived. Altogether, at the beginning of the campaign the prospect of rat proofing the city was appalling. The enforcement of the rat-proofing ordinance has constituted the bulk of service work.

Provisions were made, definite and specific in detail, for the rat proofing of all structures then existent or to be built in the future. In addition to the requirements for buildings, provisions were included for maintaining all premises, improved or unimproved, open lots,

areas, etc., free and clean of rubbish or material that might serve as a rat harborage or that such materials should be elevated not less than 2 feet from the ground level.

All structures except stables were divided for rat-proofing purposes into class A and class B. Special provisions were made for stables. Under class A fell all food depots. Under class B all other buildings in which no foodstuffs were stored or kept for sale. Rat proofing of class A buildings embraced the installation of concrete floors protected on all sides by a marginal wall of masonry extending 2 feet beneath the surface of the ground and 1 foot above the floor level. In addition to this were provisions for the removal of double-wall spaces and ceilings for their proper protection against the ingress of rats.

Rat proofing of class B structures contemplated their elevation from the ground not less than 18 inches, leaving the underpinning open and free on not less than three sides, or, at the option of the owner, the inclosure of the building on all sides by a wall of masonry extending 2 feet beneath the surface of the ground and upward meeting the floor of the building. Adequate rat proofing of all wall space and accidental and unnecessary openings was likewise provided for. Rat-proofing operations were conducted as follows:

The inspectors would make their daily round of inspection, entering on an inspection blank for each premises the actual conditions existing thereon that were pertinent to the rat-proofing requirements. On the reverse of the inspection card notations were made as to the structural repairs necessary for making the property rat proof as provided in the rat-proofing ordinance. The inspection reports were brought to the district office and from such data a rat-proofing notice was prepared, signed by the district officer and sent to the owner or agent of the property. On the face of this notice was entered the name of the owner, agent, or occupant legally responsible for the performance of the repairs, the location of the premises, and in detail the conditions existing therein which constituted rat harborage and which were in violation of the law. This was followed by direction "to comply with the provisions of the ordinance as indicated in specific section or sections" and "as specified in the various marked paragraphs on the reverse side of this notice." On the reverse side of these notice forms were printed all the details of rat proofing applying to the various parts of a building, open areas, sidewalks, or the varied conditions obtaining.

Many buildings on account of their dilapidated condition have been demolished or dismantled by the owner in preference to rat proofing them. A certain number were replaced by buildings that are an ornament to the city instead of an eyesore; in other instances the site has been left unbuilt upon and clean. In all 7,088 buildings have been so destroyed, for the most part to the advantage of the owner and to the improvement of the physical appearance of the city. At the time the rat-proofing ordinance was drafted it was believed to be inadvisable to prescribe any method of construction, ingredients, or material other than that specified in the building code of New Orleans. It was subsequently discovered, however, that the building code is not sufficiently definite in various details, as some of its provisions can be so construed as to make for faulty construction.

The prevention of dishonest practices on the part of workmen or contractors has caused an infinite amount of painstaking care on the part of service officers and employees. Not infrequently the contractor would attempt to sink the wall less than the prescribed 2 feet or build a wall only 4 inches thick instead of the regulation width of "not less than 6 inches," or use cinders mixed with dirt and ashes, or attempt to use a wholly inadequate proportion of cement in mixing concrete. These were only a few of the many tricky practices attempted by workmen, and it was to prevent this imposition upon the owner who paid for proper construction and materials, as well as to prevent such ineffective rat-proofing measures, that the inspection force has had to practice strict supervision of all work in progress.

A specified time was given for the initiation of the work, with notice of prosecution for noncompliance. This time limit was never rigidly enforced. It was only after a considerable lapse of time and when it was evident that the party responsible for the repairs was intentionally disregarding the notice that prosecution in the courts was resorted to.

The cost of rat proofing buildings in New Orleans during the past fiscal year has amounted to \$3,861,264.06. This total is only an approximate value, but is believed to be fairly accurate, as the data has been compiled from the separate cost of individual premises, as stated by the owner or contractor. While these figures do not include new construction, the repairs accomplished probably do embrace alterations in old buildings in excess of rat proofing.

A summary of the operations follows:

Recapitulation of rat-proofing operations, New Orleans, La., for fiscal year ending June 30, 1915.

Buildings:

Completed, rat proofed.....	74, 526
Incomplete, work begun.....	39, 301
Noncompliant, no work done.....	37, 819
Originally rat proof, no work required by service.....	804
Demolished.....	7, 088

Total number.....	159, 538
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Work performed:

Square yards concrete laid.....	1, 196, 170
Linear feet chain wall installed.....	2, 070, 256
Linear feet flashing laid.....	884, 444
Square yards tar-cinder floor laid.....	42, 789
Linear feet wall fill installed.....	298, 308
Total cost rat proofing.....	\$3, 861, 264. 06

City blocks.....	number.....	4, 439
Main buildings.....	do.....	77, 049
Rear buildings.....	do.....	82, 489
Inspections, original.....	do.....	76, 285
Notices served, original.....	do.....	79, 027

	Rat proofed.	Non- compliant.	Total.
Dwellings.....	46, 907	20, 529	67, 436
Food depots.....	3, 396	442	3, 838
Stables.....	2, 685	951	3, 636
Miscellaneous business buildings.....	4, 167	873	5, 040
Cisterns.....	6, 058	6, 242	12, 300
Chicken yards.....	5, 637	8, 936	14, 573

Garbage cans, number installed.....	53, 884
Premises fumigated, sulphur.....number--	187
Premises sprayed with pulecide kerosene emulsion.....do--	7, 027
Rat harbors near plague foci destroyed by removal of wood floors, planking, and elevation of lumber, etc.....number--	7, 968
Planking removed from open yards, lots, etc.....square yards--	1, 072, 392
Legal cases:	
Acquitted.....number--	24
Withdrawn at request of service (rat proofed).....do--	880
Convicted.....	209
Appealed.....	114
Pending June 30.....	1, 091
Amount of fines imposed.....	\$2, 275

CONDITION OF NEW ORLEANS WHARVES.

Thus far only a comparatively small stretch of the wharves has been made rat proof. The term rat proofing, when applied to such structures as wharves, which are generally open and more or less filled with large quantities of merchandise in which rats may seek harborage, can be used only in a comparative sense. To prevent rats obtaining a permanent harborage is the most that can be expected in making wharves and docks "rat proof." In the western end of New Orleans the Stuyvesant Dock, a structure about one-half mile long, owned by the Illinois Central Railroad Co., has been made relatively rat proof, at a cost of \$13,900. Of the wharves under the control of the dock board, the Pauline Street Wharf was made rat proof at a cost of \$2,000 (approximately), and the rat proofing at the Toulouse Street Wharf (4 blocks in length) is at present nearing completion. The repairs in this latter structure will amount to \$50,000. Plans have been made and the contract let for the reconstruction of the wharf of the United Fruit Co., the contemplated expenditure amounting to \$100,000.

Surg. Creel states that plans have been drawn up for the rat proofing of all the wharves, but to what extent these contemplated repairs will ever be effected is problematical. At present the greater part of the river front is not rat proof; in fact, there exists most ample rat harborage. Therefore, by no possible flight of the imagination could the wharves of the New Orleans river front be considered as fortified against the reintroduction of plague. Until rat proofed they will exist as a menace to the remainder of the city.

MISCELLANEOUS RAT-PROOFING PROCEDURES.

The rat proofing of junk yards presented some difficulty, especially the larger ones, where thousands of tons of metal are kept. No flooring, concrete or otherwise, would bear this heavy weight, so that for practical purposes a special method was devised for the rat proofing of this class of establishments.

Class A construction was required where certain kinds of junk was deposited, such as bones, old rope, rubber bags, and crated articles—materials that might attract rodents. In those locations where metal only was deposited a rat-proof compound was required, a wall extending into the ground 2 feet and upward 10 feet, no materials to be piled against the wall and gateways kept closed and protected

against the incursion of rodents. Similar provisions were also made for cotton-press yards. There were many such structures destined to be used for a comparatively short period of time, until the municipal cotton warehouse should be completed. Marginal rat proofing was, therefore, adopted for the cotton-press yards.

During the campaign, Asst. Surg. Gen. W. C. Rucker designated a board of officers for the purpose of preparing a "rat-proofing manual." This board, composed of Passed Asst. Surg. Hugh de Valin, Passed Asst. Surg. Fiench Simpson, Asst. Surg. H. F. White, Asst. Surg. C. V. Akin, and Sanitary Engineer H. P. Letton, completed its labors and the manuscript has since been submitted to the bureau, but as yet has not been published. A very complete and detailed presentation of the subject was made in the manual, and when published should form a most excellent guide to those concerned or interested in rat-proofing methods.

BENEFITS OF RAT PROOFING TO THE CITY OF NEW ORLEANS.

First of all, rat proofing has been the foremost factor in controlling plague infection, thereby not only safeguarding the health of citizens but also protecting the city from a commercially ruinous quarantine. It has instilled in owners and tenants a pride in the appearance of their property that many did not formerly possess, thus creating an element conducive to civic beauty. It has put its stamp on future construction in New Orleans that will make for sightlier and more sanitary buildings.

The city is situated on low lying, damp ground, and wooden floors undergo comparative early decay. The wonder is that concrete floors, which are economically cheaper in the end, have not been more widely constructed.

The rat-proofing campaign has been productive of an increased circulation of several million dollars during a period of financial depression. While other cities were maintaining a "bread line" in the fall and winter of 1914, New Orleans had no indigent to feed or otherwise assist. Aside from the service employees paid by the Government, hundreds of mechanics were afforded occupation who otherwise would have been without employment, and the money came from sources—i. e., property owners—where the disbursement occasioned the least hardship.

By excluding rodents from buildings there will result an economic gain. Concrete flooring has already proven an economic saving in warehouses where there is considerable trucking to be done by reducing the amount of labor. With smooth flooring fewer men can handle trucks than were formerly necessary. Concrete flooring in general is more easily cleaned than wood flooring, and in other ways is more sanitary.

During the past year there have been destroyed more than 400,000 rodents, largely due to effective rat proofing. For the ensuing year there will be a saving of property that otherwise would have been destroyed by their depredations. Based on an accepted average maintenance cost per rat of \$1.80 per year, the saving to New Orleans would amount to \$720,000. Granted that this computation may be difficult of verification, the saving would still be conceded as a very great one.

The rat proofing required for cisterns has been sufficiently costly to induce many owners to destroy these mosquito-breeding receptacles. A large percentage of cisterns inspected have been destroyed, all to the advantage of mosquito reduction.

Rat-proofing requirements have very materially facilitated the installation of plumbing and sewers and the construction of sanitary toilets in place of many old cess pools. Civic beauty has been enhanced by the removal of many dilapidated unsightly buildings and by the rehabilitation of others in a poor state of repair.

That these opinions regarding the value of rat proofing are also held by the more intelligent citizens was ascertained when 100 property owners who had completed rat proofing were selected at random and specifically questioned for an unbiased opinion regarding the benefits derived. The replies received are recorded as follows: Eleven out of 20 noted improved health conditions, and 63 of 67 considered the premises much more sanitary. Eighty of 83 reported the improvements of economic benefit, and 33 of 38 noted less food waste. Of 85 questioned, all agreed that rats had been eliminated as the result of the repairs. Four reported an increase of business due to the improved appearance, and 4 had been able to obtain a reduction in insurance rates.

FINANCIAL.

At the beginning of the campaign it was contemplated that the expense of the work would proportionately be borne by the Federal Government, the State, and the city.

During the first two months the Government and the city each assumed approximately two-fifths of the expenses, the State contributing one-fifth. Subsequent to October 1, 1914, to which date it had contributed about \$20,000 to plague-eradication measures, the State authorities refused to further bear any part of the expenditures and the service assumed this additional expense. Owing to the depleted condition of the city finances, the Federal Government has from time to time been contributing a proportionately greater amount of the expense of the campaign until at present its share is about 90 per cent of the total. The service has avoided the acquisition of any unexpendable property, excepting a limited amount of office furniture, the funds disbursed being for salaries and expendable supplies. The maximum total monthly expenditure was that for August, 1914, \$56,049.51, the minimum that for June, 1915, \$34,006.89. The total expenditures to date have been \$526,704.27. Of this, the Federal Government has paid \$378,227.12, the city \$128,477.15, and the State, \$20,000.

CONCLUSION.

In conclusion, note should be made of the almost universal spirit of cooperation met in New Orleans. Notwithstanding the many handicaps due to an unstable subsoil, difficult drainage problems, and a very large number of disinterested absentee landlords, little interested in the city's progress, its citizens have turned to and in the course of one year have spent nearly \$4,000,000 in fortifying the

city against the further occurrence of bubonic plague—material evidence of their appreciation of the sanitary, economic, and commercial benefits to be derived.

This report would be incomplete without recognition of the co-operation and assistance of the Hon. Martin Behrman, mayor of the city; Dr. W. T. O'Reilly, president of, and Maj. W. L. Hughes, attorney for, the Board of Health of the City of New Orleans; the entire force of city officials, the press, and to civic organizations too many to enumerate by name. To Maj. Hughes is due especial credit for his zeal and unremitting labor in the preparation, enforcement, and defense of the ordinances enacted by the city for its protection against plague; to Dr. O'Reilly, for his earnest cooperation and the assistance of his office without fear or favor in the solution of the many knotty problems encountered in the application of plague-eradivative measures. The untiring efforts of these officers merit the commendation of the entire municipality.

PLAGUE-SUPPRESSIVE MEASURES IN CALIFORNIA.

These operations have been conducted during the fiscal year by Surg. J. D. Long, and, since November 14, 1914, by Passed Asst. Surg. J. R. Hurley. The laboratory operations have been in charge of Asst. Surg. N. E. Wayson through the year.

OPERATIONS IN SAN FRANCISCO.

The work in the San Francisco division may be classified under the following headings:

1. Measures for the destruction of rats.
 - (a) Trapping.
 - (b) Poisoning.
2. Measures for the elimination of rat food.
3. Measures for the destruction of rat harbors and for the permanent rat proofing of buildings.
4. Measures adopted to free shipping of rats.
5. Miscellaneous work of the service.

MEASURES FOR THE DESTRUCTION OF RATS.

TRAPPING.

This measure has been persistently carried on throughout the fiscal year, but on a smaller scale than previously, although the methods followed have been continued.

From July 1, 1914, to October 31, 1914, an average of 2,125 traps were distributed along the water front and the contiguous district by a force of Federal employees composed of eight rat catchers under the supervision of a foreman.

Five men were dispensed with on October 31, 1914, leaving a force of three rat catchers and one foreman for the balance of the fiscal year. From November 1, 1914, to June 30, 1915, an average of 1,215 traps were in use, all trapping being concentrated on the water front and adjoining premises. Rats trapped or found dead were carefully tagged, giving the precise location where obtained, the character of the premises, the date, and were counted and separated with ref-

erence to species, these items being posted in a journal. They were then shipped to the Federal laboratory for post-mortem examination.

During the year 15,710 rats and 3,005 mice were trapped, none of which were reported suspicious or positive for plague.

The following statement indicates the character and number of premises trapped, number and kind of traps used, and the resultant catch for the period July 1, 1914, to June 30, 1915, with from three to eight trappers in the field:

Character of premises.	Premises.	Cage traps.	Snap traps.	Rats trapped.
	<i>Number.</i>	<i>Number.</i>	<i>Number.</i>	<i>Number.</i>
Stores.....	132	2	740	3,127
Sewers.....	93	96	2	1,990
Restaurants.....	33	.....	179	794
Stables.....	18	.....	100	394
Dwellings.....	55	.....	221	639
Factories.....	24	.....	121	428
Vacant lots.....	16	3	87	610
Warehouses.....	129	.....	891	4,125
Water front.....	2	10	406	1,148
Butchertown.....	52	.....	227	1,396
Steamers ¹	110	4	251	1,059
Total.....	664	115	3,225	15,710

¹ Steamers trapped on 661 times.

POISONING.

In the eradication work phosphorus and arsenic poisons were used, the former being placed principally in sewers and on the water front, the latter confined to premises where there might be danger from fire.

The following tables summarize the operations for the destruction of rats during the past year, and the comparative catch of the different species from 1909 to 1915, inclusive, is also shown.

Measures for the destruction of rats.

Number of rats trapped.....	15,710
Number of rats found dead.....	86
Number of mice trapped.....	3,005

Comparative catch of various species of rats.

Species.	1909	1910	1911	1912	1913	1914	1915
Norvegicus.....	78,630	72,613	58,856	46,597	51,140	46,600	8,490
Rattus and alexandrinus.....	4,162	10,509	13,429	21,525	19,190	16,856	7,306
Total catch.....	82,792	83,122	72,285	68,122	70,330	63,456	15,796

MEASURES FOR THE ELIMINATION OF RAT FOOD.

Complaints made to the San Francisco Board of Health relative to nuisances are submitted to the Public Health Service for investigation, owing to the fact that they refer principally to exposed rat food and rat-proofing requirements. During the fiscal year 2,890 complaints were investigated, 20 per cent of which represented rat

complaints, indicating that the public in general has become educated to the importance of ridding their premises of rats.

A city ordinance provides that any receptacle to be used as a garbage can must not be offered for sale or otherwise disposed of which does not have upon it the inspection stamp or mark of the board of health. During the year 31,844 new garbage cans were inspected and stamped. Of this number, 28,986 sanitary garbage cans were installed by individuals of their own volition, and 2,858 were installed by direction of the service. These cans are constructed of metal, are water-tight, and are provided with close-fitting metal covers. The following statement indicates the measures carried out for the protection or destruction of rat food:

Number of—

Premises inspected	84,141
Nuisances abated	17,604
Complaints investigated	2,890
Garbage cans installed	2,858
Chicken yards abandoned	467
Chicken houses concreted (7,376 square feet)	99
Chickens, pigeons, rabbits, etc., disposed of	6,780
Premises screened	252
Toilets screened	240
Notices served	6,801
Plumbing complaints referred to board of health	59
Vacant lots cleaned	154
Basements cleaned	515
Yards cleaned	979
Premises cleaned of rubbish	778
Plumbing nuisances abated	182
Lots from which stagnant water has been pumped	21
Garbage cans inspected and stamped	31,844

MEASURES TAKEN FOR DESTRUCTION OF RAT HARBORS.

Since the passage of the ordinance prohibiting the covering of the ground area of basements, passageways, yards, and sidewalks with wood, affording a convenient harborage for rats, large numbers of such wood-covered areas have been removed, but there still remain a number of such harborages. When found rat-infested they are ordered torn up and the ground left bare or covered with concrete, cement, or cinders.

The following statement indicates measures taken for the destruction of rat harbors:

Number of—

Floors torn up	1,357
Basements torn up	255
Yards torn up	279
Passageways torn up	224
Sidewalks torn up	68
Buildings destroyed	929
Premises in which wood was piled off the ground	42

MEASURES FOR THE PERMANENT RAT PROOFING OF NEW BUILDINGS.

As required by law, the full floor area under all buildings constructed in San Francisco must be covered by concrete not less than 1½ inches thick and surrounded by brick, stone, or concrete foundation walls extending 12 inches above the surrounding soil. If the base-

ment or floor areas are to be used for any purpose, said floors shall be constructed of not less than 3 inches of concrete, covered with a wearing surface of cement not less than one-half inch in thickness, troweled to a smooth surface.

Arrangements have been made with the board of public works so that copies of all applications for building permits are mailed to the local office of the service. Two inspectors from the office are detailed to inspect the building operations and enforce the rat-proofing requirements. During the year 1,859 buildings were inspected and more than 6,000,000 square feet of concrete were used in rat proofing the same.

The following statement shows the measures taken for permanent rat proofing of new buildings:

Number of—

New buildings rat proofed	1, 859
Basements concreted (2,496,994 square feet)	3, 061
Floors concreted (2,869,404 square feet)	1, 567
Yards concreted (409,432 square feet)	1, 067
Passageways concreted (409,253 square feet)	2, 367
Sidewalks concreted (685,135 square feet)	1, 496
Total square feet concrete laid in new premises	6, 870, 218

MEASURES ADOPTED FOR THE RAT PROOFING OF BUILDINGS IN THE FIRE LIMITS.

All buildings within the fire limits are of fireproof construction, having the ground concreted. In many instances rats gain access to these buildings through openings left in walls and ceilings after the installation of plumbing and wiring, also through roof ventilators, basement ventilators, unused chimney flues, sidewalk gratings, basement windows, and nonrat-proof doors. An inspector has been constantly detailed in the district bounded by the fire limits, and upon learning of the above defects, the necessary rat-proofing requirements have been sent to parties responsible for the existing conditions, and after a reasonable lapse of time a reinspection has been made to see if the requirements have been complied with. As a general rule but little difficulty is encountered in having the necessary work done on these fireproof buildings, as the usual expense, relatively speaking, is small.

The following is a summary of this work done during the fiscal year:

Number of buildings containing rat harbors abated	583
Ventilators on roof screened	26, 152
Ventilators in basement screened	23, 484
Unused chimney flues screened	26, 963
Windows screened	2, 493
Sidewalk gratings screened	27, 395
Wire cloth used	473, 794 square feet
Lens lights replaced	151, 093
Doors rat proofed	209
Inclosed dead spaces opened up	615
Openings around pipes closed with cement	14, 845
Conduits closed with cement	1, 920
Openings in walls, ceilings, and floors closed by wire, lath, and cement	31, 626
Floors complying with section 199 (wire cloth)	73
Area	85, 590 square feet
Wooden floors removed	22
Area	38, 129 square feet

Basements concreted.....	10
Area	square feet... 26, 783
Floors concreted.....	192
Area	square feet... 324, 675
Finished ceilings removed from basements.....	6
Area	square feet... 6, 565

THE REPAIRING OF NONRAT-PROOF BUILDINGS WITH RAT-PROOF MATERIALS.

Premises occupied for the handling or sale of foodstuffs are regulated by city ordinances, which provide for concrete floors and suitable foundation walls, or of double floors between the layers of which shall be placed galvanized iron cloth of not less than No. 20 gauge wire, the mesh of which is not more than one-half inch, said cloth to extend over the entire floor area and on the walls to the height of 8 inches. Buildings containing places where foodstuffs are handled are inspected by a service inspector and persons who are found maintaining their premises in violation of the city ordinances are directed to comply with the law. Upon failure or neglect on the part of persons to comply with the requirements after a reasonable length of time the case is recommended for condemnation and referred to the city health officer, who sets the date for hearing before the board of health. The result of this is an order from the board either to repair, vacate, or demolish the building.

Result following board of health action in condemnation proceedings during fiscal year.

Number of buildings submitted to board of health for condemnation.....	314
Buildings acted upon by board and condemned.....	243
Buildings acted upon by board and not condemned.....	106
Buildings recommended for condemnation, but not yet heard by board.....	34
Buildings given rehearings by board.....	531
Buildings abated following condemnation proceedings.....	¹ 364
Buildings condemned and remaining unabated.....	374

The following table shows the work accomplished during the past year in the shape of remodeling nonrat-proof buildings, using rat-proof material:

Number of buildings rat proofed by concreting.....	3, 214
Basements concreted (816,024 square feet).....	1, 018
Floors concreted (1,538,979 square feet).....	1, 261
Yards concreted (240,420 square feet).....	459
Passageways concreted (219,038 square feet).....	1, 019
Sidewalks concreted (679,150 square feet).....	1, 553
Stables concreted (196,093 square feet).....	297
Chicken yards concreted (7,376 square feet).....	99
Total square feet concrete laid in old premises.....	3, 696, 080
Number of area walls installed.....	1, 561
Area.....	cubic feet... 338, 860
Number of buildings rat proofed by area walls and wire cloth.....	285
Area.....	square feet... 294, 186

During the latter part of the fiscal year 1914 an ordinance, drafted by the service officer in charge, regulating the manufacture, handling, and sale of foodstuffs, was submitted to the board of health, and after due consideration and slight amendments was referred to the board of supervisors and enacted into law September 24, 1914. The

¹ These include some buildings condemned during previous years; hence total will not balance.

ordinance provides that no person or corporation shall maintain or operate any place in which food is handled, stored, or prepared for sale within the city and county of San Francisco without having first obtained a certificate issued by the board of health stating that the premises are in a sanitary condition and that all provisions or regulations relating to the conduct of such business have been complied with.

An agreement was made with the board of health that copies of all applications for health officer's certificates, including the food inspectors' recommendations, be referred to the service representative. An inspection of the premises is made to determine whether or not rat-proofing requirements have been complied with. If not, a notice of the necessary requirements is made out and mailed, together with the food inspector's recommendations to the applicant. After a reasonable length of time the premises are reinspected and, if all requirements have been complied with, the service representative notifies the health officer to that effect, whereupon a certificate is issued to the applicant. Plans are now being perfected for the scoring of places handling foodstuffs by the use of score cards similar to those now in use for the inspection and scoring of dairies.

The following table shows the work accomplished under the new ordinance:

Number of buildings inspected.....	1, 313
Number of buildings rat proofed by concreting.....	341
Basements concreted (71,327 square feet).....	51
Floors concreted (263,312 square feet).....	386
Yards concreted (11,023 square feet).....	27
Passageways concreted (5,082 square feet).....	19
Sidewalks concreted (11,613 square feet).....	21
Total square feet of concrete laid.....	362, 357
Number of area walls installed (41,044 cubic feet).....	124
Number of buildings rat proofed by area walls and wire cloth (196,799 square feet).....	190
Premises screened.....	188
Toilets screened.....	148

A city ordinance similarly provides for the issuance of revocable permits by the board of supervisors for the construction and maintenance of stables in the city and county of San Francisco. Copies of all applications for stable permits are referred to the Public Health Service by the board of health. This necessitates an inspection. The necessary requirements are made out and forwarded to the applicant and failure to comply results in the revocation of the permit.

The following table shows the number of stables inspected and requirements sent during the fiscal year:

Number of stables seeking permits inspected and requirements sent....	1, 578
Number of stables destroyed.....	235
Number of stables concreted.....	297
Area.....square feet.....	196, 093
Number of stables cleaned.....	807
Number of manure bins installed.....	532
Number of feed bins installed.....	387
Number of area walls installed.....	267
Area.....cubic feet.....	39, 173

METHODS ADOPTED TO FREE SHIPPING OF RATS.

The department quarantine regulations have been rigidly enforced. All vessels from foreign and plague-infected ports of the United States, Hawaii, and the Philippine Islands have been required to wear regulation rat guards on all lines and to breast off 6 feet from the wharf. An inspector was detailed to cooperate with the chief quarantine officer of the port in enforcing the above regulations, and in addition to inspect for rat evidences all cargoes from plague-infected ports. The following tabulation shows the operations in connection with shipping and along the waterfront:

Number of inspections made of vessels for rat guards	1, 196
Vessels inspected for rat guards	354
Reinspections made on vessels	1, 145
New rat guards procured	684
Defective rat guards repaired	445
Vessels on which cargo was inspected	79
Pieces of cargo inspected for rat evidence	37, 758
Rats on wharves and waterfront	1, 148
Rats trapped on vessels	1, 059
Average number of traps set on wharves and waterfront:	
Cage	8
Snap	205
Average number of traps set on vessels:	
Cage	4
Snap	164
Number of vessels trapped on	110
Times trapped	661
Vessels searched for dead rats after fumigation ¹	54
Dead rats found on vessels after fumigation	689
Mus norvegicus	28
Mus rattus	304
Mus alexandrinus	357
Number of M. musculus taken dead from vessels after fumigation	15
Number of poisons placed on waterfront	260, 300
Number of poisons placed within the Panama-Pacific International Exposition grounds	274, 100
Bait used on waterfront and vessels (bacon)	309
Amount of bread used in poisoning water front	867
Number of pounds of poison used on water front	437

MISCELLANEOUS WORK OF THE SERVICE.

In many instances the service is called upon to give advice and offer suggestions to those who are required by the law to put their premises in a sanitary condition. During the past fiscal year the medical officer in charge has met very little opposition in this respect, which is encouraging when the wide field covered by city ordinances relating to sanitation is taken into consideration.

The board of health regulations require that sanitary and rat-proof manure bins be installed in all stables. Considerable difficulty has heretofore been encountered in the enforcement of the ordinance, largely owing to a lack of knowledge or understanding on the part of the public regarding what was required. To facilitate the enforcement of the law the service representative in cooperation with a local architect drew up a set of plans and specifications which would fulfill the requirements. These were forwarded to the city health officer with recommendations that they be adopted by the board of health

¹ The fumigation of vessels was taken over by the chief quarantine officer on or about Dec. 1, 1914.

as a standard for manure-bin construction in the city of San Francisco. After due consideration and some slight amendment, at a meeting held April 15, 1915, the board approved the recommendations and officially adopted the plans for use in connection with the enforcement of its stable regulations.

OPERATIONS FOR THE ERADICATION OF PLAGUE AMONG GROUND SQUIRRELS.

SQUIRREL-FREE ZONE.

The squirrel-free zones mentioned in previous reports, comprising areas in which rodent extermination was energetically sought for in order to prevent the dissemination of plague infection from city rats to country ground squirrels and vice versa, have not been strictly maintained during the year for the following reasons:

No plague-infected rats have been found in San Francisco since October, 1908, though a surveillance over the rat population has been continuously kept since that time; and no plague-infected ground squirrel ever has been found in San Mateo County, which borders San Francisco on the south, rendering the zone south of San Francisco no longer necessary.

Work has been continued in a less intensive manner on the zone east of Oakland and Berkeley, and squirrels are reported very scarce in that district. No plague-infected squirrel has been found in that zone throughout the year or for a period now of nearly three years.

The work has been continued with the same organization and system as in previous years, as follows: In each of the nine counties in which plague infection has been found a supervising inspector has been stationed. The counties have been divided into districts of approximately 40,000 acres and a field inspector assigned to each. The field inspectors were directed to serve written notices upon the owners of infected lands to destroy squirrels, as provided by law, agreeing upon a date when the work was to be instituted. If upon reinspection it was found that the work had not been commenced, the case was reported to the supervising inspector, who thereupon collected such data as was necessary for the officer in charge. Orders were then issued for the concentration of a sufficient force of State employees upon the land to do the work, upon the completion of which a statement of the expense incurred was submitted to the owner, and he was given opportunity to pay the same forthwith if he so desired. If the bill was not paid as presented, same was forwarded to the State board of health for collection in the manner provided by the California Legislature in an act approved June 7, 1913.

It became necessary during the fiscal year to proceed upon the lands of 42 persons. An idea of the cooperation obtained from individuals in the destruction of ground squirrels may be gleaned from the fact that out of a total of 18,131 inspections and reinspections made during the year in the nine infected counties, but this number had to be proceeded against in a summary manner, as provided by law.

INSPECTION OPERATIONS.

During the year operations as outlined above have been carried on in the following counties: Alameda, Contra Costa, San Joaquin,

Stanislaus, Merced, San Benito, Santa Clara, Santa Cruz, and Monterey.

In addition to the above nine infected counties, work was carried on for part of the year in San Mateo County. The work in this county was confined to the land adjacent to the borders of Santa Clara and Santa Cruz Counties, the object of this being to prevent the migration of San Mateo County squirrels over the border, with consequent reinfestation of lands in the two contiguous counties that had been cleared of squirrels, and, to a certain extent, to protect San Mateo County from the incursions of any possibly infected squirrels from the bordering previously infected counties.

Including the work done in San Mateo County, a total of 18,659 inspections and reinspections, over an area of 8,231,556 acres, have been made during the year, and a total of 1,672,869 acres have been treated with poisoned grain or other squirrel-destructive agents, as a result of the inspections made and the notices served.

HUNTING OPERATIONS.

At the close of the fiscal year ended June 30, 1914, there was a total of 150,151 acres of known infected lands. During the last fiscal year infected squirrels were found on various ranches, amounting to 21,366 acres of land, where infection was hitherto not known to exist.

The total area of infected land on June 30, 1915, was 171,517 acres. In addition thereto there were 98,320 acres of land which immediately surrounded or adjoined the infected land. This adjoining territory was subjected to the same intensive treatment that was given to the actually infected land. The total area of infected and adjoining territory is, therefore, 269,837 acres.

Nearly all of this land has been shot over during the recent hunting season to determine whether any infection still remained, and hunting will be continued thereon until completed.

The following table gives a summary of the hunting operations for the period April 1 to July 1, 1915, and for the purpose of comparison the same data for similar periods of the preceding three years:

Summary of hunting operations for the period Apr. 1 to July 1, 1912-1915.

	1912	1913	1914	1915
Ranches hunted over	723	990	1,464	1,902
Number of squirrels shot	19,335	16,186	13,162	15,594
Hunters engaged, average	9	17	21	26
Average days each man hunted	64.4	49.4	57.2	59.5
Squirrels per hunter per day	33.3	19.2	10.5	7.6
Squirrels shot per ranch	26.7	16.3	8.5	8.1
Infected squirrels shot during period	506	253	44	10
Per cent of squirrels infected	2.61	1.74	.34	.05

As will be noted from the table given above, there has been a steady and regular reduction of the number of squirrels shot per hunter per day during the last four years, notwithstanding that the skill of the hunters and their efficiency have increased, the personnel of the hunters remaining largely the same. Likewise, there has been a

steady reduction in the number of squirrels shot per ranch during the same period. It needs no further evidence to prove the effectiveness of the squirrel-eradication methods carried on during the past five years.

April 1 to July 1 is commonly known as the hunting season in squirrel-eradication work, for it is during these months that the new litters of squirrels commence to come above ground to play and feed. These young squirrels are apparently more susceptible to plague than the older ones, and in them the infection is more likely to be acute. Fleas likewise begin to increase at this time of the year. In counties where the infected and adjoining territory is large, hunting is continued into July, and later if necessary, to insure that all such territory is thoroughly shot over. In certain of the counties a few men have been kept hunting throughout the year.

The following table gives the data of hunting operations during the entire fiscal year:

Ranches on which plague-infected squirrels have been found since July 1, 1914.....	22
Ranches hunted over during fiscal year.....	3, 924
Squirrels shot.....	29, 032
Squirrels found dead.....	189
Total squirrels shot and found dead.....	29, 221
Squirrels examined.....	29, 057
Squirrels found infected with plague.....	39

The 39 infected squirrels mentioned in the preceding table were found as follows:

County.	Ranch.	Infected squirrels.	Completed or working.
Alameda.....	Sullivan.....	2	Completed.
Do.....	Fredericks.....	6	Do.
Contra Costa.....	Brown.....	2	Do.
Do.....	Moraga Grant.....	1	Do.
Do.....	Moraga Land Co.....	2	Do.
Do.....	Brookwood Acres.....	1	Do.
Do.....	Lawrence.....	1	Do.
Do.....	Slater.....	1	Do.
Do.....	Brown.....	1	Do.
Do.....	Hornsacker & Bailey.....	1	Do.
Do.....	Hornsacker.....	1	Do.
Do.....	Silva.....	2	Do.
Do.....	Johnson.....	1	Do.
Do.....	Withers.....	3	Do.
Do.....	Baralda.....	1	Working.
Do.....	Bruno.....	2	Do.
Do.....	Walker.....	1	Completed.
Do.....	Thornton.....	1	Working.
Do.....	Burgess.....	1	Completed.
San Benito.....	Watson.....	1	Do.
Do.....	Paicines.....	1	Do.
Do.....	Sally.....	3	Working.
Do.....	Watson.....	2	Do.
Do.....	McGrury.....	1	Completed.
Total.....		39	

Of the 39 infected squirrels, 9 were found during June, 1915, and of these, 8 were secured during the last two weeks of that month.

At the date this report was written intensive eradication measures were under way on the ranches where recent infection has been found. These measures should be completed within a month after the close of the fiscal year.

ECONOMIC BENEFITS.

While it is known that great economic benefits to landowners must accrue from the destruction of ground squirrels, owing to the increase in the crops harvested, it was decided to ascertain if possible the exact value in dollars and cents of squirrel-eradication measures. To this end a form circular letter has been sent to farmers and others, requesting them to give an estimate of the amount saved. Almost without exception they have returned the filled-out blanks promptly, together with remarks appreciative of the work.

In the Public Health Reports, volume 29, No. 50, December 11, 1914, there appeared an article by Surg. J. D. Long, entitled "The Economy of Ground Squirrel Destruction," the data in which was based on the returns received in the early part of the year. Since that time a large number of additional returns have been received, and the data from these, added to that already reported, show the following economic benefits that resulted from crops saved and increased value of land, nursery stock, etc.

Economic benefits of squirrel destruction in nine counties in California cultivated lands.

223 persons saved 2,175 tons of hay-----	value--	\$18, 992. 72
278 persons saved 2,800.4 tons of grain-----	do-----	54, 539. 50
86 persons saved 337.5 tons of fruit-----	do-----	5, 603. 50
17 persons saved 33,395 pounds of nuts-----	do-----	1, 915. 00
38 persons saved 294 tons of vegetables-----	do-----	4, 031. 00
Average amount expended per person in squirrel destruction-----		73. 32
Average amount saved per person-----		187. 70

Two hundred and eight persons reported that 3,100 more head of stock could be pastured on 180,859 acres of pasture land than could be pastured before squirrels were destroyed, or 1 additional animal to each 58.3 acres of pasture. This alone, at a fair estimated figure of \$1 per month per head, represents a saving of \$37,200. In addition to this, various other savings were reported, in shape of diminished expense for repairs to ditch and canal banks, the number of young trees saved from injury and death, and the saving of harvested crops stored in granaries, etc.

GENERAL CONSIDERATIONS.

The board of supervisors of all the infected counties, excepting Contra Costa, have rendered financial assistance and cooperation either for part of or throughout the entire year. They have appropriated sums ranging from \$200 to \$500 per month, payable out of county funds, to pay for transportation of the inspectors detailed to their counties and for the purchase of supplies to be used on the county roads, etc.; in addition, furnishing the supervising inspector with an office in the courthouse at the county seat.

Reports concerning the successful squirrel-destruction work in the infected counties and its economic benefits to the farmers have been carried into neighboring counties. As a result, numerous requests have been received for advice and assistance from other counties, and from ranchers in various sections of the State. The service, of course, could not aid in an active way in the destruction of squirrels from a

purely economic standpoint, unless the question of plague infection was also involved. Printed matter and advice, however, has in every instance been afforded, and expert supervision has been furnished to 43 landowners, who have paid all expenses in carrying out squirrel-eradication measures on their lands. Several counties—San Mateo, Santa Barbara, and others—have set on foot independent squirrel-eradication campaigns, patterned after the methods followed by the service, their object being to comply with the demands of the ranchers and rid the county of ground squirrels for the economic benefits that will accrue. This goes to show that the problem of the ground squirrel pest, formerly believed to be one to be endured like drought or frost, is now generally coming to be believed as one possible of solution.

The invention of the service squirrel-destructor pump, described in an article by Surg. John D. Long, published in Public Health Reports, volume 27, September 27, 1912, has done more than any other one thing to convince the ranchers that squirrels can be eradicated from their lands. It is something that will give immediate results, with a reasonable effort and comparatively small expenditure of funds.

CONCLUDING REMARKS.

No case of human plague occurred anywhere in California during the last fiscal year.

It is gratifying to note that regarding the hunting operations over all the infected and adjoining lands during the three months of the recent hunting season, no infection was found in any of the counties excepting Contra Costa and San Benito, giving reason for belief that plague infection has been eradicated from seven of the nine previously infected counties.

In dealing with so virulent and, in many ways, so mysterious a disease as plague, from lessons learned in the past, it would be unwise to predict to a certainty that the disease is completely wiped out from any particular locality, or that it can be eradicated within any given time. Notwithstanding this, there are reasonable grounds for the belief that plague has been eradicated from all the counties in California but the two of Contra Costa and San Benito. Moreover, it seems reasonable to expect that another year, or at the most two years, of work in those counties of the same intensive character as in the past should likewise eliminate from them the infection. Should this be accomplished it will demonstrate for all time what at first seemed to be an impossibility, that given the requisite money, time, and men, plague among ground squirrels disseminated over a large terrain, can be stamped out, supplemental to the claim that the infection can be eradicated from city rats, this now being a demonstrated fact.

LABORATORY OPERATIONS, SAN FRANCISCO, CAL.

As in previous years, the work of the laboratory has included systematic examination of squirrels, rats, and other animals for the presence of plague. Experimental work and laboratory examinations for other branches of the Government, the Panama-Pacific International Exposition, and the city of San Francisco have been carried on. The work of the laboratory has been expanding year by

year until it now performs practically all the functions of a public health laboratory, as well as those for which it was originally installed.

The routine dissection of rodents for the detection of plague has been continued, and in all suspects resort has been had to animal and cultural proofs. Examinations have been made and findings obtained as follows:

	Received.	Examined.	Infected.
Squirrels.....	29,221	29,057	39
Rats.....	16,925	14,559	.....
Other animals.....	3,006	29	.....

EXPERIMENTAL WORK.

Plaguelike disease.—During these examinations cases of the plague-like disease described by Surg. G. W. McCoy, Public Health Bulletin No. 43, have been found in Monterey, San Benito, Alameda, and Contra Costa Counties. In the light of the recent work of Dr. William B. Wherry, "A New Disease of Rodents Transmissible to Man," Public Health Reports, December 18, 1914, describing the occurrence of this plaguelike disease in human beings, the spread of the infection to rodents as far north as Alameda and Contra Costa Counties is considered worthy of note, since the towns of Alameda, Oakland, and Berkeley are located in the former of these two counties.

The transmission of this disease by the stable and house fly has been accomplished, as reported in the Public Health Reports, December, 1914. Several experiments of flea transmission, using a large number of fleas over a long period of time, have been positive, but in no case in which the factor of contaminated food and bedding could be absolutely eliminated. Efforts at direct transmission by individual fleas which had fed on a host suffering with a high degree of septicemia have been uniformly negative. Three experiments using ticks as agents of transmission have also been negative. The disease has been proven infectious for kittens, as evidenced by a violent conjunctivitis, cervical and mediastinal adenitis, leucocytosis, hyperpyrexia, and, in one case, death. The conjunctivæ of the kittens were inoculated directly from cultures of the bacterium on egg-yolk media.

Plague transmission.—Efforts have been made through a series of experiments to duplicate the results obtained by the Indian Plague Commission (Plague Supplement No. 111, Journal of Hygiene) in the direct transmission of plague by fleas which had been fed on an infected rodent host, and which had developed cultures of *Bacillus pestis* in the proventriculus. The results have thus far been negative, though the study is being continued.

A most interesting development occurred when early this spring a batch of fleas collected from Contra Costa County for experimental purposes, anesthetized to facilitate handling and quarantined in the laboratory for two weeks, were allowed to feed on a guinea pig. They promptly infected the guinea pig with bubonic plague. The animal died with typical gross anatomical findings of an acute plague septicemia, and *Bacillus pestis* was isolated from the heart

blood. The district from which the fleas had been collected had not shown recent evidence of rodent infection, but intensive hunting, which was begun immediately subsequent to the above finding, yielded within a few days two plague-infected squirrels. Further corroborative experiments of quarantining infected fleas, without a host, under conditions otherwise simulating those in nature, and also under surroundings approximating those involved in commercial shipping, have resulted in positive inoculations after 14 and 21 days, respectively.

Other experimental work has included tests to determine the effect of the storage of water for shipment in certain containers manufactured for the collection of field samples by the laboratory. No decided change in the bacteriological count was found after 48 hours.

Several new squirrel exterminators for sale in the local market were tested and found to be less efficient than those now in use.

In pursuance to bureau instructions concerning the inspection of laboratories applying for a license for the interstate sale of biological products, bacteriological purity tests were made of several such products.

Successful isolation of the typhoid bacillus was made from the bile obtained by gastric lavage from a seaman typhoid carrier whose feces had been bacteriologically negative for a period of several months.

A series of tests has shown that iron in water has an inhibitory effect on the sterilizing qualities of hypochlorite of lime in proportion to the amount of ferrous iron present in the water.

ASSISTANCE TO OTHER BRANCHES OF THE PUBLIC SERVICE.

Numerous laboratory examinations have been made for the United States Marine Hospital stations of San Francisco, Seattle, Portland, and Los Angeles; also for the United States Immigration Hospital and Quarantine Station of San Francisco, Coast Guard Service, Indian Service, the Panama-Pacific International Exposition, and the city of San Francisco.

Upon request of the chief quarantine officer of the port stool examinations were made of a group of Filipinos detained in quarantine as possible cholera-carrier suspects and one patient was returned to the Philippines on the evidence found.

An investigation was made of a small outbreak of typhoid fever on a steamship operated by the Matson Steamship Navigation Co., plying between San Francisco and Honolulu, with negative findings in the individuals employed in the galley suspected as carriers.

During the diphtheria epidemic in San Francisco in the fall and spring of the present fiscal year assistance was rendered the local board of health and over 2,000 examinations of cultures from the throats of carriers and acute cases were made in conjunction with the City Isolation Hospital, as were numerous urine examinations and vaginal smears. Many of the carriers found were positive over a period of from six weeks to four months.

At the request of the officer of the service in charge of the sanitation of a summer camp located on the Russian River in California,

conducted and frequented by several hundred of the leading citizens of San Francisco, a sanitary survey and examination of the water supply was made, with the resulting recommendation that the hypochlorite treatment and rapid sand filter plants be better controlled and greater storage capacity provided.

Upon the request of the service officer detailed as chief sanitary officer for the Panama-Pacific International Exposition sanitary surveys of the plant and watersheds producing water for distribution in the grounds of the exposition were made. The raw water was bacteriologically examined and the efficiency of the filters and chlorinating plant were periodically tested and the reports of the results filed with the chief sanitary officer. The water now distributed conforms to the standard of bacteriological limitations as adopted by the United States Public Health Service for the control of sources of drinking water supply furnished to common carriers in interstate traffic.

Likewise a series of tests was made on the efficiency of two electric water purification processes whose agents desired to install and operate plants for the distribution of water within the grounds of the exposition. Both were condemned.

A summary of the examinations made is as follows:

Wasserman tests.....	519
Feces for typhoid.....	64
Urine for typhoid.....	1
Bile for typhoid.....	5
Blood for typhoid (Widal).....	26
Feces for cholera.....	8
Sputum for tuberculosis.....	2
Urine for tuberculosis.....	2
Tissue for tuberculosis (animal inoculation).....	2
Prostatic abscess fluid for tuberculosis.....	1
Spinal fluid for tuberculosis.....	2
Urinalysis.....	109
Feces analysis (blood).....	2
Gastric analysis.....	13
Spinal fluids.....	4
Ophthalmia smears.....	10
Vaginal smears.....	82
Diphtheria cultures.....	2, 267
Histological examinations.....	9
Post-mortem examinations.....	29
Water examinations.....	64

EDUCATIONAL.

The technique of the Wasserman test was demonstrated over a period of a month to a medical officer of the United States Department of Justice, and facilities were afforded for the practice of the tests by him.

The methods of examination and investigation of rodents for the presence of plague were demonstrated, and facilities were provided and assistance rendered in autopsies performed in conjunction with the City Isolation Hospital on subjects dead of contagious diseases, including scarlet fever, measles, diphtheria, and leprosy, with demonstrations to the students of local medical and nursing schools.

Two sets of practical experiments were conducted before the consuls and several property holders of some of the Central American

States. The methods of squirrel extermination as practiced in California were shown on a squirrel burrow built on the laboratory station. Asphyxiating gases volatilized by the squirrel destructor were tested in the destruction of red ants and the "taltuza" (probably one of the *geomydæ* of gophers), which infest these countries.

PLAGUE-SUPPRESSIVE MEASURES AT SEATTLE, WASH.

All plague-suppressive measures are now under the supervision of the Public Health Service, and Surg. B. J. Lloyd has been continued in charge.

It will be recalled that from June 30, 1913, to June 30, 1914, 40 plague-infected rats were found in different parts of the city of Seattle. Only 12 infected rodents have been discovered during the past year. Trapping has been conducted at intervals in Tacoma, Bellingham, and Everett, but no infection has been found. The cities of Everett and Tacoma have recently passed ordinances requiring the rat proofing of new buildings, and an inspector of this service is cooperating with the building inspector in Everett in enforcing the ordinance.

All vessels calling at Seattle during the fiscal year ended June 30, 1914, were fumigated twice in succession. During the year ended June 30, 1915, these vessels were fumigated once more as a routine measure, and later from time to time they have been fumigated when conditions warranted. This fumigation included vessels plying between ports in the State of Washington, these having been fumigated by the service officer in his capacity as deputy State health commissioner.

Fending and rat guarding have been continued as during the previous year, foreign and interstate vessels being required to fend and guard at all times. Local vessels are required to fend and guard at night only.

During the latter part of the fiscal year intensive trapping has been inaugurated in the plague-infected district. The cooperation of agents, owners, and occupants of buildings has been secured through public meetings and the continuance of trapping operations obtained. The last infected rat was found on January 11, 1915, the circumstances being so unusual as to merit a separate description.

On January 11, 1915, the State horticulturist of Washington, who also acts for the Federal Service, had occasion to open a large box of plants which arrived at the port of Seattle, Wash., from Yokohama, Japan. On opening this box of plants, a rat was found in the soil at the bottom of the box. The inspector killed the rat and delivered it to the local representative of the Public Health Service, who, after a careful bacteriological examination, reported that it was suffering from chronic (bubonic) plague.

A thorough investigation into the history of the box makes it certain that there were only two possibilities, either that the rat came all the way from Japan inside the box of plants, or that it entered the box at the appraiser's building at Seattle, as that building was the only place in the city of Seattle where the box was opened previous to its opening on the sidewalk at the place of business of the importer to whom the plants were consigned.

Conditions were such that the rat might have survived the journey from Japan to the United States, and, while admitting the possibility that it may have entered the box in Seattle, this is not considered probable. At any rate, the rodent was in the box and nailed up in such manner as to make escape practically impossible when it left the appraiser's building. The only way the rat could have escaped would have been for it to have gnawed its way through the box. The distance from the appraiser's building to the importer's place was about half a mile, and it was fortunate that the rodent made this short journey instead of having been shipped halfway across the continent to infect some other locality. Systematic examinations of plant shipments arriving from Japan were instituted at once, but no further infestation has been found. Since this date no infected rats have been discovered.

Summary of plague-suppressive measures at Seattle, Wash.

New buildings inspected.....	2, 399
Basements concreted, new buildings (893,189 square feet).....	743
Floors concreted, new buildings (1,100,095 square feet).....	967
Yards, etc., concreted, new buildings (175,559 square feet).....	190
Sidewalks concreted.....square feet.....	1, 640, 850
Total concrete laid, new structures.....do.....	3, 809, 693
New buildings elevated.....	373
New premises rat proofed, concrete.....	1, 900
Old buildings inspected.....	332
Premises rat proofed, concrete, old buildings (86,940 square feet).....	65
Floors concreted, old buildings (53,835 square feet).....	52
Premises otherwise rat proofed, old buildings.....	90
Openings screened, old buildings.....	1, 502
Wire screening used.....square feet.....	65, 113
Rat holes cemented, old buildings.....	5, 685
Wooden floors removed, old buildings.....	50
Doors rat proofed, old buildings.....	250
Buildings razed.....	147

WATER FRONT.

Inspection and reinspection of vessels and histories recorded.....	2, 980
Vessels fumigated.....	137
Sulphur used.....pounds.....	69, 489
New rat guards installed.....	896
Defective rat guards repaired.....	348
Fumigation certificates issued.....	137
Canal certificates issued.....	68
Port sanitary statements issued.....	2, 278

LABORATORY OPERATIONS.

Dead rats received.....	1, 271
Rats trapped and killed.....	17, 503
Rats recovered after fumigation.....	961
Total	19, 735
Rodents examined for plague infection.....	15, 531
Rodents proven plague infected.....	12
Blocks poisoned.....	471
Poison distributed.....pounds.....	1, 743
Bodies examined for plague infection.....	61
Bodies found plague infected.....	None.

Classification of rodents:

Mus rattus	747
Mus alexandrinus	2, 537
Mus norvegicus	11, 914
Mus musculus	3, 110
Unclassified	314

MISCELLANEOUS.

Rat-proofing notices sent to contractors	410
Letters sent property owners requiring traps to be installed	245
Letters sent in answer to rat complaints	350
Lectures delivered on sanitary subjects	6

Plague preventive measures in other cities.

Rodents examined in Tacoma	396
Rodents proven plague infected	None.
(Work started Oct. 1, 1914; final Jan. 2, 1915.)	
Rodents examined in Bellingham	205
Rodents proven plague infected	None.
(Work started Jan. 9, 1915; final Feb. 20, 1915.)	
Rodents examined in Everett	947
Rodents proven plague infected	None.
(Work started Feb. 25, 1915, still in operation.)	

Rat-proofing operations in Everett, Wash., Mar. 27, 1915, to June 30, 1915, inclusive.

New buildings inspected	49
New buildings rat proofed by concrete foundations	34
New buildings rat proofed by elevation	14
New buildings, basements concreted (5,198 square feet)	7
New buildings, floors concreted (2,800 square feet)	1
New buildings, yards, etc., concreted (1,653 square feet)	6
Total concrete laid	9, 651 square feet

PLAGUE-PREVENTIVE MEASURES AT MOBILE, ALA.

Following the outbreak of plague at New Orleans, measures were adopted at Mobile, Ala., to prevent the introduction of the disease, and upon the request of representative business organizations an officer was detailed to act in an advisory capacity to local health officials, Surg. S. B. Grubbs being assigned to the duty August 18, 1914. The situation was somewhat unique. Without the actual presence of plague in the city, sentiment had been aroused by an educational campaign conducted through the press and public meetings toward preventing the introduction of the disease, and the citizens were determined that the necessary measures to accomplish this end should be at once instituted.

Upon the recommendation of Dr. Grubbs, a rat-proofing ordinance was drafted and passed by the city council, the ordinance providing that all buildings or edifices, irrespective of the nature of construction, lying within certain areas should be rendered rat proof by either elevation or the use of concrete, brick walls, tiles, or other impermeable material. In addition, regulations were enforced dealing with the disposal of garbage and wastes and the protection by rat guards and fending off of all vessels entering port. The catching and systematic examination of rodents was also inaugurated. It is believed that the measures instituted were an important factor in preventing plague invasion of the city.

ROCKY MOUNTAIN SPOTTED FEVER INVESTIGATION AND ERADICATION.

The investigation of Rocky Mountain spotted fever, a disease which is assuming greater importance as the extent of its ravages becomes known, was continued during the year throughout the Rocky Mountain region of the United States, at the field laboratory in Victor, Mont., during the spotted-fever season, and at the Hygienic Laboratory during the winter months.

The work of eradicating the disease from the Bitter Root Valley, Mont., was carried on, as heretofore, during the active tick season, from March 15 to June 30. Surg. L. D. Fricks was continued in charge of the spotted-fever work, and two additional officers, Asst. Surgs. Liston Paine and R. R. Spencer, were detailed at the beginning of the tick season to assist in the investigation of the disease.

One of the first and most important steps in the investigation of Rocky Mountain spotted fever from a public-health standpoint is the determination of the extent of the disease and the locating of the infected areas within the territory involved. In cooperation with the State health officers of California, Colorado, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming, in which districts are included all of the known areas of infection, this work has been pushed vigorously, until now cases of spotted fever are being collected and reported from every one of the States.

At the request of the State health officer of Wyoming, a survey of that State was made during August, 1914, for the purpose of determining the extent of the infection in that region. Previous to 1914 cases of Rocky Mountain spotted fever had not been reported to the State health officer of Wyoming. Records of 372 cases, with 29 deaths, were obtained, and areas of infection were found scattered over the entire State except in the extreme southeastern part.

An investigation of cases suspected of spotted fever, which were reported from Custer County, Mont., this season, revealed the first recorded spread of the disease into new territory. This spread into the State of Montana appears to have taken place from northeastern Wyoming, undoubtedly by means of infected ticks brought in on horses and cattle during the spring and early summer months. An extension of the disease into the Warm Springs Indian Reservation in the State of Oregon was also reported this year. These two outbreaks of Rocky Mountain spotted fever in widely separated and previously uninfected localities show that there is a real danger of the spread of the disease wherever the wood tick is given means of transportation and can find conditions favorable for its growth and reproduction. They also indicate the necessity for the supervision of the movement of live stock from infected territory during the tick season.

A survey of the State of Idaho was made during the present season for the purpose of determining the influence of stock migration and sheep grazing on tick infestation, together with any other factors which might bear upon the extension or restriction of the disease.

The work of tick eradication in the Bitter Root Valley, Mont., was continued by the Public Health Service for the fifth consecutive season along the following lines:

(1) Dipping of domestic animals for the destruction of adult ticks.
 (2) The killing of small wild animals, which serve as hosts for the immature ticks.

(3) Sheep grazing.

The dipping of domestic animals in the southern half of the Bitter Root Valley was carried out by means of the three vats erected in the west side foothills. The working radius of each vat is 5 miles, and all of the animals within this area suspected of harboring ticks were dipped regularly at intervals of 10 days from the last week in March until the middle of May. After the 15th of May very few ticks were found attached to the cattle, but the horses continued to pick them up until well along in June.

The following table gives the number of domestic animals dipped, including redippings, in three districts in the Bitter Root Valley during the fiscal year:

Victor:	
Horses	132
Cattle	265
Hamilton:	
Horses	57
Cattle	230
Hogs	66
Sheep (after completion grazing experiment and shearing)	846
Goldcreek:	
Horses	61
Cattle	193
Hogs	23

In addition to dipping, all domestic animals were regularly inspected for attached ticks at weekly intervals.

From observations made on the dipping of domestic animals, as conducted in the Victor district during the past five years, it appears that the dipping will cause a certain reduction in the tick infestation, but that this procedure alone will not entirely exterminate the ticks, and unless supplemented by some other method of tick eradication it must be continued indefinitely in order to prevent reinfestation. The killing of small, wild animals, which was begun in the Victor district in 1911 and extended to the Hamilton and Goldcreek districts in 1913, was carried on throughout the entire southern half of the Bitter Root Valley during the present season. The territory actually covered in these operations comprises a narrow strip on the western border of the valley, averaging 2 miles in width and 50 miles long, in which is included slightly more unfenced than fenced land. The small animal principally considered, because it is most numerous in the Bitter Root Valley and shows a higher percentage of tick infestation, was the ground squirrel (*Citellus columbianus*).

In carrying on the work of destroying small animals effort has been made to secure the cooperation of the landowners to the extent of their furnishing the labor required in freeing their property from such animal pests. The following measures were employed in the destruction of small animals in this territory: (1) Trapping, (2) shooting, (3) poisoning, and (4) use of carbon bisulphide pumps.

Of these methods, shooting and poisoning were found to yield the best results. One thousand pounds of poisoned oats were distributed, the greater part by the farmers on their own land, early in the season. In parts of the foothills the results showed more than 90 per cent of

the squirrel population killed by one poisoning. In the meadows and fields the results obtained were not so good. Thirty thousand .22-caliber cartridges were distributed to the farmers living on the west side of the valley. The number of squirrels killed in this way was well worth the expenditure involved. The carbon bisulphide pump does not appear to work well in loose, sandy soil of the Bitter Root Valley.

SHEEP GRAZING.

Two flocks of sheep were grazed on the west side of the valley during the present season, and in addition many of the farmers have begun to purchase a few head of sheep and are attempting to breed small bands of their own for the protection which they will give while grazing around the ranches. Two deductions appear to be warranted from the sheep-grazing experiments which have been conducted in the Bitter Root Valley during the past three seasons: First, by starting a large number of sheep in at the foothills and grazing them back into the mountains, the entire tick infestation may be removed from the valley, and, second, the individual farmers living on the west side of the valley can secure small bands of sheep having heavy, greasy coats and graze them around their ranches in such a way as to greatly reduce the tick infestation and the consequent danger of Rocky Mountain spotted fever infection.

SANITARY, EDUCATIONAL, AND RELIEF WORK IN ALASKA.

The sanitary, educational, and relief work in Alaska has been performed in cooperation with the Bureau of Education, Department of the Interior, under the direction of Passed Asst. Surg. Emil Krulish. The sanitary work includes the prevention of the spread of communicable diseases, the enforcement of quarantine regulations, and the management of outbreaks. The educational work chiefly consists of the instruction of the representatives of the Bureau of Education in matters of sanitation and direct instruction of the people themselves. The relief work is performed upon the occasion of the visits of the sanitary officer to the various villages and settlements.

The plans and estimates of expenditures for the establishment of an adequate medical service for the natives of Alaska, under the Department of the Interior, prepared and submitted to Congress by the Commissioner of Education, with the advice and cooperation of the Public Health Service, resulted in an appropriation of \$25,000. This sum is far below the estimate, but as it is the first appropriation for medical relief allowed by Congress it is most gratifying to those interested. At a conference between officials of the Bureau of Education and officers of the Public Health Service, held in Washington, to consider the expenditure of this fund, it was decided to build and equip a hospital at Juneau, which will be available to the 5,000 natives located in southeastern Alaska. Institutions of this character are essential factors in the eradication of diseases among the native population, and it is hoped that the next appropriation will permit hospitals to be established in other sections of the Territory.

The reports of teachers in the Alaska school service indicate that the health of the natives has been exceptionally good and that the sanitary conditions in the villages and homes are improving. The teachers are the only "doctors" and health officers in the majority of the native settlements, and they have been impressed with the fact that instruction in health matters is just as essential as teaching the three R's. The order abolishing the public towel and drinking cup in the schools, the talks on elementary hygiene and sanitation delivered before meetings of natives in their homes, and the supplying of teachers with medicine chests and medical handbooks, are some of the factors utilized in this health campaign. Pamphlets on the cause, prevention, and cure of tuberculosis have been issued to pupils throughout the school service, and "How to keep well" cards placed in the homes. Various bulletins issued by the Public Health Service on health subjects have been distributed to the field workers for their information and guidance. This campaign against disease has resulted in the general improvement of the health of the natives of Alaska, and already the morbidity and mortality rates from the various diseases have begun to fall.

An intensive sanitary campaign was carried on in southeastern Alaska during the winter. The native villages were visited in turn and as much time as required devoted to sanitary and relief work in each community. For the lack of hospitals, equipment, and assistance the relief work was necessarily limited and at times unsatisfactory. In the surgical work the teacher usually assisted the operator and the schoolroom was utilized as an operating room.

The following is a record of diseases and injuries treated and operations performed:

Record of diseases and injuries:

Tuberculosis, all forms	44
Bronchitis	31
Tonsillitis	11
Pharyngitis	7
Bronchopneumonia	2
Pleurisy	3
Empyema	1
Toothache	31
Constipation, chronic	6
Gastritis	7
Errors of refraction	14
Pterygium	7
Corneal opacity	12
Conjunctivitis	16
Trachoma	8
Dacrocystitis	4
Cataract	3
Keratitis	9
Influenza	18
Scrofula	19
Dentition	9
Varicella	9
Rachitis	4
Syphilis	15
Valvular heart disease	4
Rheumatism	31
Lumbago	9
Sciatica	4
Burns	9
Impetigo	5

Record of diseases and injuries—Continued.

Furunculosis.....	8
Eczema.....	4
Enuresis.....	5
Prostatitis.....	3
Cystitis.....	4
Gonorrhea.....	5
Salpingitis.....	6
Leucorrhea.....	3
Metorrhagia.....	2
Mastoiditis.....	2
Otitis media.....	6
Parturition.....	5
Mastitis.....	3
Cerebral tumor.....	1
Potts fracture.....	1
Wounds, miscellaneous.....	45
Abscess, miscellaneous.....	6
Sprains, miscellaneous.....	6
Miscellaneous.....	43
Records of operations:	
Chalazion.....	1
Staphyloma of cornea.....	1
Pterygium.....	3
Ectropion.....	1
Lipoma, excision.....	1
Harelip, repair.....	1
Myomectomy.....	1
Glands in neck, excision.....	1
Tonsillectomy and adenectomy.....	63
Teeth extractions.....	31

WATER AND ICE SUPPLIED BY INTERSTATE CARRIERS.

Amendment No. 6 to the interstate quarantine regulations, promulgated January 25, 1913, provides that common carriers shall furnish certificates of purity of all water and ice used by passengers on cars, vessels, or vehicles operated in interstate traffic, such certificates to be provided by State and municipal authorities within whose jurisdiction the supply is obtained. The enforcement of this regulation is now on a much more satisfactory basis.

The sources of supply of all lines are classified by States, modifications being made from time to time of the tabulated lists. The number of sources has materially increased during the year as compliance with the regulation became more general. The certificates as forwarded by steamship lines and railroad companies are checked against such lists, certificates being renewed twice a year. Notification is given all lines when such certificates become due.

State and municipal health authorities have cooperated in the enforcement of the regulation. In certain municipalities regular and systematic bacteriological examination of the water supply is the rule, but in a much larger number of towns and cities no examination is conducted, the purity of the water not being questioned. The enforcement of the interstate quarantine regulations has led to an investigation of these supplies, and in numerous instances the water has been found grossly contaminated. An outcome, therefore, of the enforcement of the present regulation has been not only to improve the quality of the water furnished passengers on common carriers, but indirectly to raise the standard of that used by the general public. Furthermore, in at least one State, the regula-

tions have given the State department of health an opportunity to bring about improvement in several of the smaller municipal supplies, authority to accomplish which had not been granted under State laws.

Whenever a supply is reported as polluted, the common carrier is directed to discontinue the use of the water or by proper treatment to render it incapable of conveying disease, acknowledgment of the receipt of the notification to this effect being required. Should a subsequent examination show that the quality of the water has improved to such an extent as to render it safe for consumption, the interdiction is removed. Water of a suspicious character is re-examined until sufficient data is obtained upon which to base a decision. A large number of polluted water supplies have thus been discovered, and measures to prevent contamination have immediately been instituted. In the majority of instances common carriers have voluntarily relinquished the use of such supplies when the pollution was determined.

In certain cases State and municipal authorities have evidenced a reluctance in certifying to either the purity or the contamination of the supply. In instances of this character officers have been detailed to make sanitary surveys of such supplies to determine by bacteriological examination the quality of the water. In the greater number of these cases contamination has been found.

During the year two amendments to the interstate quarantine regulations, relating to water furnished by common carriers, have been adopted.

PURE DRINKING WATER FOR CREWS AND EMPLOYEES OF COMMON CARRIERS ENGAGED IN INTERSTATE TRAFFIC.

(Amendment to Interstate Quarantine Regulations No. 8, Public Health Service.)

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, September 16, 1914.

To medical officers of the Public Health Service, State and local health authorities, and others concerned:

The following amendment is hereby made to the interstate quarantine regulations promulgated by this department September 27, 1894, and amended August 17, 1905, June 24, 1909, May 15, 1912, October 30, 1912, December 9, 1912, January 25, 1913, and June 4, 1914, said amendment and regulations being in accordance with section 3, act of Congress approved February 15, 1893.

Article 3, General Regulations, is hereby amended by the addition of the following paragraph:

PAR. 17. Common carriers while engaging in interstate traffic shall not furnish to their crews or employees any polluted water for drinking purposes which may contain organisms or materials likely to cause a contagious or infectious disease, nor shall such carriers maintain or permit to be maintained upon their vessels or vehicles, or at or near their stations or other ordinary stopping places over which they may have control, any tank, cistern, receptacle, hydrant, or article with water which may contain such impurities, in such manner that water therefrom may be conveniently obtained by the crews and employees mentioned for drinking purposes, unless such common carriers maintain a notice upon said vessels or vehicles and at, near, or upon every said tank, cistern, receptacle, hydrant, pump, well, stream, brook, pool, ditch, or other place or article, with water therein containing such impurities, forbidding the use of such water for drinking purposes by the crews or employees of the said common carriers or by the general public while engaging in interstate commerce.

W. G. McADOO, *Secretary*.

The purpose of amendment No. 8 is to prevent common carriers from furnishing to crews or employees polluted water for drinking purposes or to maintain upon their vessels, vehicles, or at stations facilities where such water may be conveniently obtained, unless notices are posted stating that the water is unfit for human consumption. Numerous instances of the occurrence of outbreaks of intestinal diseases have been reported as the result of such practices and the custom has been quite general of furnishing water in this manner. The amendment places the responsibility for the continuance of the practice upon the common carrier. Certificates of purity of water furnished in this manner are not required. Nevertheless it devolves upon the common carrier to properly safeguard such watersheds and surroundings and to determine by periodical bacteriological examinations that the water is of proper quality.

PURE WATER FOR PASSENGERS UPON VESSELS OPERATING IN INTERSTATE COMMERCE.

(Amendment to Interstate Quarantine Regulations No. 9.)

TREASURY DEPARTMENT, OFFICE OF THE SECRETARY,
Washington, January 12, 1915.

To medical officers of the United States Public Health Service, State and local health authorities, and others concerned:

The following amendment is hereby made to the interstate quarantine regulations promulgated by this department September 27, 1894, and amended August 17, 1905, June 24, 1909, May 15, 1912, October 30, 1912, December 9, 1912, January 25, 1913, June 4, 1914, and September 16, 1914, said amendment and regulations being in accordance with section 3, act of Congress approved February 15, 1893.

Article 3, General Regulations, is hereby amended by the addition of the following paragraph:

PAR. 18. Common carriers operating vessels in commerce between the several States and Territories or the District of Columbia, for passengers in interstate traffic, shall not supply for the use of said passengers any water taken from a lake or stream over which the vessel is being navigated unless the same is certified by the United States Public Health Service or the State or municipal health authority within whose jurisdiction it is obtained as conforming to the bacteriological standard for drinking water promulgated by the Secretary of the Treasury under date of October 21, 1914: *Provided*, That water in regard to the safety of which a reasonable doubt exists may be used if the same has been treated in such manner as to render it incapable of conveying disease, and the fact of such treatment is certified by the aforesaid health authority or by the Surgeon General of the United States Public Health Service or his accredited representative.

W. G. McAdoo,
Secretary of the Treasury.

Under the provisions of amendment No. 9, common carriers operating passenger vessels between the several States and Territories or the District of Columbia are forbidden to supply for the use of passengers any water taken from a lake or stream over which the vessel is being navigated unless the same is certified by a National, State, or municipal health authority, within whose jurisdiction it is obtained, as conforming to the bacteriological standard for drinking water promulgated by the Secretary of the Treasury October 21, 1914.

The degree of pollution of our inland waterways is rapidly increasing. However safe the consumption of water from such sources was in previous years, the fact has been definitely and conclusively established that its use is no longer without danger. The bacteriological evidence of contamination of lakes and rivers is fully substantiated by

clinical data at hand. Epidemics of typhoid fever, gastroenteritis, and other intestinal infections have been of frequent occurrence among travelers on inland waters. The typhoid admission rate at marine-hospital stations on the Great Lakes has also been high. Many of these epidemics among passengers and sailors employed on lake and river steamers have been referred to in previous annual reports. Infection in this manner has probably also had much to do in maintaining high typhoid morbidity rates in the lake districts. In view of these facts, it became apparent that the time had arrived when the practice of furnishing water without regard to its quality should be discontinued, and that vessels be required to either obtain their supplies from sources which are known to be uncontaminated or to treat the water in such a manner as to render it safe for consumption. The process of water purification has now developed to such an extent and is so simple and inexpensive that the use of doubtful or dangerously polluted waters has become all the more reprehensible. The effect of the enforcement of this regulation is already apparent, numerous vessels upon inland waters having installed purification plants and others limiting their supplies to waters of known purity.

BACTERIOLOGICAL STANDARD FOR DRINKING WATER.

For the purpose of the administration of the interstate quarantine regulations as they relate to drinking water supplied to the public by common carriers, it became necessary to establish a bacteriological standard for such waters and to define the limits of permissible impurities thereof. The standard is one recommended by a commission named for the purpose by the Secretary of the Treasury on January 22, 1913, the commission being composed of the following members:

- John F. Anderson, Director Hygienic Laboratory, chairman of the commission, Washington, D. C.
Edward Bartow, Director Illinois water survey, Urbana, Ill.
Charles C. Bass, Director laboratory of clinical medicine, Tulane University, New Orleans, La.
S. J. Crumbine, Secretary State board of health, Topeka, Kans.
Edward C. Franklin, Professor of chemistry, Leland Stanford Junior University, Stanford University, Cal.
Henry Hanson, Bacteriologist, State board of health, Jacksonville, Fla.
Charles Gilman Hyde, Professor of sanitary engineering, University of California, Berkeley, Cal.
Edwin O. Jordan, Professor of Bacteriology, University of Chicago, Chicago, Ill.
Allan J. McLaughlin, Surgeon, Public Health Service, Washington, D. C.
William H. Park, Director research laboratories, department of health, New York City.
Milton J. Rosenau, Professor of preventive medicine and hygiene, Harvard University, Boston, Mass.
William T. Sedgwick, Professor of biology, Massachusetts Institute of Technology, Boston, Mass.
George C. Whipple, Professor of sanitary engineering, Harvard University, Cambridge, Mass.
C.-E. A. Winslow, Curator, department of public health, American Museum of Natural History, New York City.
Wade H. Frost, Passed assist surgeon, Public Health Service, recorder of the commission, Washington, D. C.

It became evident soon after the work was instituted that considerable difficulty would necessarily be encountered in establishing definite standards for drinking water so furnished. The supplies provided by common carriers are from widely diversified and mixed

sources, the samples represent waters which have been stored under varying conditions for various lengths of time, and owing to the impossibility of determining the source and the conditions under which the water is gathered greater reliance than is ordinarily justified must be placed upon bacteriological findings. For these reasons considerable care was exercised in determining the standard, more than a year being devoted to discussion and study of the problems involved.

The following is the standard recommended by the commission and adopted by the Department of the Treasury:

THE BACTERIOLOGICAL STANDARD FOR WATER.

The following are the maximum limits of permissible bacteriological impurity:

1. The total number of bacteria developing on standard agar plates, incubated 24 hours at 37° C., shall not exceed 100 per cubic centimeters: *Provided*, That the estimate shall be made from not less than two plates, showing such numbers and distribution of colonies as to indicate that the estimate is reliable and accurate.

2. Not more than one out of five 10-cc. portions of any sample examined shall show the presence of organisms of the bacillus coli group when tested as follows:

(a) Five 10-cc. portions of each sample tested shall be planted, each in a fermentation tube containing not less than 30 cc. of lactose peptone broth. These shall be incubated 48 hours at 37° C. and observed to note gas formation.

(b) From each tube showing gas, more than 5 per cent of the closed arm of fermentation tube, plates shall be made after 48 hours' incubation upon lactose litmus agar or Endo's medium.

(c) When plate colonies resembling *B. coli* develop upon either of these plate media within 24 hours a well-isolated characteristic colony shall be fished and transplanted into a lactose-broth fermentation tube, which shall be incubated at 37° C. for 48 hours.

For the purposes of enforcing any regulations which may be based upon these recommendations, the following may be considered sufficient evidence of the presence of organisms of the *Bacillus coli* group:

Formation of gas in fermentation tube containing original sample of water (a).

Development of acid-forming colonies on lactose litmus agar plates or bright red colonies on Endo's medium plates when plates are prepared as directed above under (b).

The formation of gas, occupying 10 per cent or more of closed arm of fermentation tube, in lactose peptone broth fermentation tube inoculated with colony fished from 24-hour lactose litmus agar or Endo's medium plate.

These steps are selected with reference to demonstrating the presence in the samples examined of aerobic lactose-fermenting organisms.

3. It is recommended, as a routine procedure, that in addition to five 10-cc. portions, one 1-cc. portion and one 0.1-cc. portion of each sample examined be planted in a lactose peptone broth fermentation tube in order to demonstrate more fully the extent of pollution in grossly polluted samples.

4. It is recommended that in the above-designated tests the culture media and methods used shall be in accordance with the specifications of the committee on standard methods of water analysis of the American Public Health Association, as set forth in "Standard Methods of Water Analysis" (American Public Health Association, 1912).

The recommendations as finally adopted do not represent the nearest approximation to purity which it is desirable to attain in drinking waters, but rather the furthest deviation from purity considered permissible and safe. They are in no sense a standard for municipalities, neither do they indicate the ideal potable water. The line of demarcation between safe and unsafe supplies is frequently not well

defined, and it is often difficult to designate a supply as belonging to either category. This fact must necessarily be borne in mind in interpreting the quality of a water by any nonelastic standard. It should also be remembered that the present standard is based solely on the results of laboratory examinations and does not include sanitary surveys of watersheds and the enumeration of undesirable or dangerous conditions thereon, a procedure which is of the greatest value.

With the various physical properties, mineral constituents, and chemical impurities the standard as adopted does not deal. This is a matter which has been left for future consideration.

It is believed that common carriers should have no difficulty in providing water to meet these requirements. It is realized that many of the public supplies of the country fall below the present standard, but unlike individual communities it is entirely feasible in the majority of instances for carriers to abandon contaminated sources for those which have been proved to be unpolluted. Where this is not the case it is practicable to obtain pure supplies from moderately polluted sources by the use of the simple and inexpensive processes which have become so general.

INTERSTATE SANITARY DISTRICTS.

CREATION OF INTERSTATE SANITARY DISTRICTS.

For the purpose of administration of the interstate quarantine regulations the territory of the United States has been divided into 12 sanitary districts. Laboratories have been established at central cities in certain of these divisions, and officers have been assigned to conduct investigations of all matters relating to the interstate spread of disease from these localities.

OPERATIONS OF THE SANITARY DISTRICT OF THE GREAT LAKES.

The laboratory of this district was established at the United States Marine Hospital, Chicago, Ill., on March 1, 1915, under supervision of Surg. J. O. Cobb, the officer in charge, Asst. Surg. C. L. Williams and Sanitary Engineer H. P. Letton being detailed to the work. Active operations in water analysis were commenced following the installation of the permanent equipment. Sanitary surveys of vessels navigating the Great Lakes were instituted, special note being taken of the water-supply systems and methods used in pumping, storing, and distributing supplies and the various means of treating this water in order to effect purification. This work will be continued during the navigation season, at the termination of which a detailed report with recommendations for corrective measures will be submitted.

An investigation of the occurrence of typhoid fever on the steamship *S. R. Kirby* was inaugurated at Cleveland, Ohio, and a report indicating that the disease probably resulted from the infection of food by a cook in the early stages of the disease was presented by Asst. Surg. C. L. Williams.

OPERATIONS OF THE SANITARY DISTRICT OF THE OHIO.

A list was made of all steamers actually in operation on the Ohio River and touching at Louisville, Ky. Practically all of these were visited and inspected and samples of drinking water as furnished to

crews and passengers taken. The bacteriological examinations were made at the Ohio River investigation station. With a single exception, the water was found polluted and not in conformity with the bacteriological standard promulgated by the Secretary of the Treasury. The responsible parties were notified that the conditions must be corrected, and the laboratory of the Ohio River investigation station is continuing the analyses of the water on these vessels. An investigation was made of all cases of typhoid fever treated in marine hospitals and relief stations on the Ohio River in the last five years, showing the steamer on which each patient was serving at the time he became ill and the period of his service. It was hoped that some conclusions of value could be drawn from these figures, but, owing to the rapid shifting of crews, no accurate conclusions could be arrived at, except possibly that the number of cases of typhoid among these men is very much larger than it should be. This method also serves to locate vessels which are apparently careless in regard to the water they are using, as the name of the same vessel frequently recurs as furnishing cases of typhoid.

SANITATION OF TRAINS AND VESSELS.

Commissioned medical officers of the Public Health Service when traveling under official orders on trains and vessels engaged in interstate traffic have continued to report regarding the sanitary condition of such conveyances under provision of department circular No. 49, of October 5, 1912. Whenever objectionable conditions have been observed and reported, common carriers have been notified thereof. The majority of such conditions may be summarized under the following heads: Careless or improper disposal of sputum; the presence of flies in dining cars and dining rooms at stations and the possibility of food contamination therefrom; infestation of sleeping and day coaches with mosquitoes in malarious districts; improper ventilation and overheating of cars; the occasional presence of vermin in sleeping coaches; insanitary condition of toilets; and insufficient or improper methods of cleaning. It will be observed that the majority of the complaints relate to conditions easy of correction.

In connection with studies of the interstate migration of consumptives, extensive investigations were made of the sanitation of railway coaches in numerous cities of the West and South by officers engaged in the work. The results of these investigations have recently been published. It was concluded that the sanitation of railway cars is largely a matter of maintaining a proper degree of cleanliness. Comparison of the methods and efficiency of cleaning at various terminals was made, and the more general adoption of modern methods recommended.

REVISION OF THE INTERSTATE QUARANTINE REGULATIONS.

The existing interstate quarantine regulations have been promulgated as necessity required during the last two decades. The early regulations were concerned principally with the prevention of the

interstate spread of such epidemic diseases as yellow fever, smallpox, and plague, and gave in detail the measures to be adopted to prevent the dissemination of infectious material. From time to time amendments have been added as our knowledge of the transmission of infection broadened. In 1905 the regulations relating to yellow fever were revised. In 1909 the transportation of lepers under proper supervision and the enforcement of sanitary precautions was made permissible, while amendments relating to the common drinking cup and the furnishing of water incapable of conveying disease were promulgated at later dates. During the period mentioned the means of the transmission of disease have been more thoroughly investigated, many of our facts definitely and conclusively established, and the methods of prevention developed. It is now known that the individual is the great source of infection, and that in large part he is responsible for the spread of diseases which are at present regarded as preventable. Upon this knowledge the modern ideas of preventive medicine are based.

The transportation of individuals in the communicable stage of disease has been the cause of the interstate spread of many infections, and epidemics of typhoid, cerebrospinal meningitis, and other affections have frequently been traceable to this cause. The furnishing of impure food and water to passengers by common carriers has likewise been a prolific source of infection. Poor sanitation of trains and conveyances, inattention to cleanliness and ventilation, improper methods of cleaning, the use of common towels and drinking cups, have all been factors in the development and dissemination of disease. In addition to the influences referred to, the increased travel has brought into direct communication remote and distant sections, and this has resulted in problems which have assumed an importance unthought of in earlier days.

The revision of the existing interstate quarantine regulations is an attempt to solve these problems. It is apparent that if modern ideas of disease prevention could be made applicable to the exigencies of interstate traffic without interference therewith and with a minimum disturbance to those engaged, an important source of disease would be eradicated. With this idea in view, an interstate sanitary board, consisting of five members, was convened at the bureau under orders of February 2, 1915, to consider the problems involved and to make such revision of the interstate quarantine regulations as was deemed necessary. The board has been in session at regular intervals during the year and has considered seriatim all questions relating to the interstate spread of disease. The present regulations have been thoroughly revised, previous amendments have been incorporated in the proposed edition, and such paragraphs added as appeared advisable.

At the annual conference of State and Territorial health authorities with the service held in Washington, D. C., May 13, 1915, the provisional regulations were the principal subject of discussion, the respective paragraphs being considered in order. After thorough exchange of views the conference recorded a vote of approval of the regulations as drawn. It is expected that the revised regulations will be promulgated during the coming year.

INSPECTION OF GOVERNMENT BUILDINGS.

In compliance with Executive Order No. 1498, of March 15, 1912, all Government buildings within the District of Columbia, with the exception of those of the War and Navy Departments, were inspected during the year, the inspections being made by Passed Asst. Surgs. E. A. Sweet and Robert Olesen. A striking improvement in sanitary conditions since the work was instituted is to be noted. Custodians, almost without exception, have evidenced a prompt willingness to correct whatever evils were brought to their attention. Naturally not all of the recommendations advanced by the inspectors can be carried into effect, owing to limited funds, the undesirability of altering rented buildings, or other reasons, but where this can not be done the insanitary feature is made a matter of record. It is considered that the necessity for work of this character is probably even greater in Government buildings outside of the District of Columbia than with those within, and an extension of the service would unquestionably result in reforms.

Conditions detrimental to the health of workers and variations from the standards of cleanliness and order to which attention was invited may be summarized as follows:

Overcrowding.—A slight amount of overcrowding develops from year to year, usually in buildings or divisions where it has not been evident previously. A floor space of 40 square feet per person and 500 cubic feet of air space has been required in all rooms, and workers have been separated by a proper distance. It is believed that there are few rooms which do not meet these requirements.

Congestion.—Marked congestion still exists in many departments. Congested areas are almost invariably insanitary, but this relationship is seldom appreciated. Recommendations have been advanced in instances where such congestion was evident, but relief is largely an administrative problem. Great improvement in orderliness has been noted.

Cleanliness.—The standard of cleanliness is probably higher than in any previous year. The differences noted in various offices depend principally upon the caretaker's conception of the term. In certain buildings which are old and dilapidated the standard is exceptionally high; in others which are comparatively easy to clean dirt and disorder are more evident.

Ventilation.—The use of ventilating window frames has been encouraged, electric fans advocated, and the importance of thoroughly airing rooms at regular intervals dwelt upon. There still remain a few sections where the natural ventilation is inadequate, but a far greater number where it is ample but not intelligently utilized.

Lighting.—The natural illumination in certain offices is not possible of correction at other than great expense. Such areas are now largely used for storage purposes. Marked improvement in the artificial lighting has been noted.

Heating.—As in nearly all public buildings, overheating during the winter months is the rule. Further emphasis has been placed upon the degree of humidity and the good effects of maintaining a proper moisture content by outside ventilation.

Water supply.—The inverted-bottle system is now in use in the majority of buildings where fountains or bubblers are not installed.

There is, therefore, but very slight chance of contamination. Carelessness on the part of employees in leaving individual glasses at fountains encourages their use by others and is the principal objectionable feature of the present system.

Toilets and plumbing.—A number of inside toilets, or those improperly ventilated, were discovered, but the evil is not great, as they have but limited use. The cleanliness was generally excellent. The majority of fixtures are modern, and washing facilities are invariably provided.

Welfare of employees.—A greater number of electric fans are in use during the heated season, locker accommodations have been increased in nearly every building, rest periods have been advocated where the occupation is tiresome or monotonous, and temperature and humidity are more carefully regulated.

During the inspection it became evident to those in charge of the work that lack of knowledge on the part of custodians and employees was in large part responsible for sanitary evils, and that the majority of improper conditions resulted from ignorance more than from any other cause. It seemed desirable, therefore, that caretakers, superintendents of divisions, and others should be provided with definite information regarding sanitary matters. For this purpose a handbook dealing with the several phases of the care and sanitation of buildings will soon be issued. In this work such subjects as lighting, cleanliness, care of waste material, etc., are considered. Definite standards are set for each and improved methods of care are described and illustrated. It is expected that the work will have an extensive field of usefulness.

INSPECTION OF THE NAVAL ACADEMY, ANNAPOLIS, MD.

Upon the request of the Secretary of the Navy, Asst. Surg. Gen. W. C. Rucker made a survey of the grounds and buildings of the Naval Academy, Annapolis, Md., to determine what measures should be taken toward the eradication of rats. While many of the buildings were apparently rat proof, it was ascertained that there were certain unguarded tunnels which afforded ingress for rodents, that there were rat harborages on and near the grounds, and that rats might obtain food from near-by refuse heaps and chicken yards, as well as from areas adjoining the academy grounds.

It was recommended that (1) rat proofing be made complete, (2) all garbage be incinerated, (3) access to other food supplies be prevented by the rat proofing of chicken yards, and that (4) rat harborages be eliminated.

SANITARY INSPECTION OF UNITED STATES LIGHTHOUSE VESSELS AND STATIONS.

Upon the request of the Secretary of the Department of Commerce numerous lighthouse stations and vessels were inspected during the year. Recommendations looking to the improvement in sanitation of such vessels and stations were offered, as well as recommendations concerning the eradication of mosquitoes and other insects, the prevention of soil pollution, and the disposal of sewage.

Instruction in resuscitating the apparently drowned was given, and all medical stores were inspected.

During the course of this inspection it was ascertained that several cases of lead poisoning had developed at various stations, and that they had undoubtedly resulted from drinking water gathered from roofs treated with lead paints.

CONTROL OF THE INTERSTATE SPREAD OF SMALLPOX.

Measures to prevent the interstate dissemination of smallpox have been continued during the year. Information regarding epidemics which have an interstate bearing are obtained from health authorities, official reports, and press clippings, and the county or municipal health authorities within whose jurisdiction the cases occur are at once communicated with to determine what measures have been instituted for the control of the disease. In those instances where there has not been stringent enforcement of quarantine this procedure has resulted in awakening officials to a proper performance of their duties, particularly where reports have been required. Instances of smallpox occurring upon interstate trains have also been investigated.

In January, 1915, an epidemic of smallpox at Chattanooga, Tenn., which had resulted in the establishment of quarantine by municipalities in Georgia and Alabama, was investigated, Surg. R. H. Creel being assigned to that duty. It was found that smallpox in benign form had been present in Chattanooga for several months and that no alarm had been felt. Vaccination had been generally neglected, except with school children. On November 9, 1914, a resident of the city returned from El Paso, Tex., in the early stages of the disease, the case ending fatally. From that time on the contagion spread, a large proportion of the cases assuming the hemorrhagic type. Until the date of the investigation, January 15, there occurred 56 cases with 16 deaths, a fatality rate of over 28 per cent. The epidemic was in no respect dissimilar from numerous others which have been recorded in various sections of the country.

ANTITYPHOID VACCINATION.

During the year a department circular was issued by the Secretary of the Treasury advising all civil employees of the Government performing interstate traffic or engaged in the handling of mail that antityphoid vaccination would be administered upon request at any of the 164 stations listed therein. The circular read as follows:

VACCINATION AGAINST SMALLPOX AND TYPHOID FEVER FOR CIVIL EMPLOYEES OF THE GOVERNMENT PERFORMING INTERSTATE TRAVEL OR HANDLING MAIL.

(1915. Department Circular No. 43, Public Health Service.)

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, February 12, 1915.

To medical officers of the United States Public Health Service, civil employees of the Government performing interstate travel or handling mail, and others concerned:

Hereafter civil employees of the Federal Government whose duties require them to perform interstate travel or who are regularly engaged in the handling of mail or other material to be carried in interstate traffic, may receive, without cost, vaccination against smallpox or typhoid fever, or both, upon applying in

person at those places designated by the Surgeon General of the United States Public Health Service, and presenting a certificate from their immediate chief, showing the nature of their employment.

Medical officers charged with the duty of performing such vaccinations should make monthly requisitions for the materials necessary therefor, and shall render a monthly report showing the names of those so vaccinated, the branch of the Government in which they are serving, and the date of said vaccination.

W. G. McAdoo, *Secretary*.

Following this announcement, several hundred employees, the majority of whom are more or less exposed to infection, have availed themselves of the opportunity and received preventive inoculation without harmful effects. While it is known that vaccination is not an absolute protection against the development of the disease, and that the immunity is probably not permanent, the treatment remains of great benefit to those liable to infection, particularly to Government employees whose duties take them in the field. A decided increase in the number vaccinated is therefore to be expected during the coming year.

SERVICE EXHIBIT AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

The service exhibit at the Panama-Pacific International Exposition has been prepared with the idea of presenting in a popular and comprehensive way the factors concerned in the dissemination of the common communicable diseases and the latest methods of prevention. In addition, various service activities are illustrated by motion pictures, including the work of the Hygienic Laboratory at Washington, the inspection of immigrants at Ellis Island, N. Y.; the relief of trachoma sufferers, ground-squirrel eradication in California, and medical inspection and procedure at national quarantine stations. A working model of a health officer's laboratory, comprising incubators, sterilizers, electrical centrifuges, and microscopes, with actual laboratory operations, such as the making of cultures, performing Wasserman reactions, and the examination of water, is an interesting portion of the exhibit. A health officer's library is a part of the office equipment. There are also models of various public health service stations, including a hospital, detention camp, and quarantine station. The exhibit material is grouped according to the disease it is designed to illustrate, the principal groups being as follows:

TYPHOID FEVER.

The story of a typhoid bacillus carrier demonstrates the rôle of carriers in the spread of the disease. Contact infection is illustrated by models. Models indicating the various stages of development of flies and the infection of oysters by sewage-polluted waters are also exhibited.

Water-borne infections of typhoid, the influence of water purification upon mortality rates, and the typhoid fever death rate of the respective States are all graphically illustrated. The pollution of wells is shown by models.

MALARIA.

The habits and life cycle of anopheles mosquitoes are demonstrated by enlarged models, comparison being made with the culex variety. The methods of prevention of mosquito breeding are depicted and a

series of 26 glass models show the development of the parasite which causes the disease. The distribution, prevalence, and economic loss entailed by malaria are explained by charts and maps.

PLAGUE.

The rat flea is represented by an enlarged model, and houses subject to rat infestation are compared with rat-proof structures. A model of a rat-proof ship, with automatic rat runs, fumigating apparatus, and vermin-proof construction, is also shown. The natural enemies of ground squirrels are represented and the methods of squirrel destruction. The world-wide distribution of plague is depicted by maps.

TUBERCULOSIS.

A model of the Public Health Service sanatorium at Fort Stanton, N. Mex., is displayed, together with an enlarged model of an improved tent house. Statistical data, in the form of charts showing the economic loss from tuberculosis, are also presented.

TYPHUS FEVER.

The distribution of the disease is represented by a map, and models of the insect responsible for its transmission are shown. Rocky Mountain spotted fever is similarly represented.

TRACHOMA.

Enlarged models of the human eye picture the appearance of the lids during the various stages of trachoma infection.

DIPHTHERIA.

Statistical data bearing on the number of deaths and the reduction in mortality by the use of antitoxin are given. Glass models of the Klebs-Loeffler bacillus are also shown.

YELLOW FEVER.

An enlarged model of the *Aedes calopus*, illustrating its habits of life, is exhibited, as well as maps indicating the world distribution of the disease.

SMALLPOX.

Wax models portray the lesions of this disease and contrast them with those of vaccination. The different stages of vaccination are also represented.

RABIES.

Charts and models give data relative to the prevalence of rabies in the United States and information regarding the Pasteur treatment.

In addition to the above, transparencies and maps were prepared depicting the causative organisms or parasites of more than 30 of the common diseases of man. A series of charts show the prevalence

of insanity in the United States and the striking facts regarding its causes and treatment. Insanitary rural schools and farmhouses are contrasted with sanitary types by means of models. The contamination of water by animal and vegetable life is shown and the disinfection of water demonstrated by an emergency hypochlorite plant in actual operation. A traveling water analysis laboratory is also a part of the exhibit. The proper methods of disposal of excreta receive considerable attention, models illustrating sewage-disposal plants and types of sanitary privies. The economic loss entailed by disease is impressed by life-sized figures. In cooperation with the Bureau of Mines, a field rescue emergency hospital has been installed and one of the service officers has regularly participated in the demonstration of mine rescue work.

The service exhibit at the exposition was prepared under the direction of Senior Surg. C. C. Pierce, and officers have been in constant attendance to explain its various phases and to demonstrate working processes.

SERVICE COOPERATION IN THE HYGIENE AND SANITATION EXHIBIT.

In the latter part of the fiscal year 1914 the bureau was requested by officials of the Panama-Pacific International Exposition to detail a service officer to render advice and assistance to the chief of the department of education and social economy of the exposition, with a view to securing and arranging for the installation of exhibits relating to hygiene and sanitation. In response to this request, Passed Asst. Surg. J. R. Hurley was directed to assume these duties. Considerable time and effort were spent in cooperating with interested parties, outlining exhibits, and formulating plans for obtaining the necessary funds. It was especially desired that good exhibits be secured relating to hygiene and sanitation of the Tropics. As finally secured, the 31 exhibits well covered the broad field of preventive medicine.

THE EMERGENCY HOSPITAL, PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

With the opening of the Panama-Pacific International Exposition the work of the emergency hospital, established by authority of the Secretary of the Treasury, has greatly increased. The hospital was founded as a working exhibit of the service, being designed to serve as a model in construction, equipment, and appliances for other institutions. The library now contains 1,250 volumes, comprising the latest editions issued by the leading publishing houses. The mechanical equipment is of the most improved pattern, and the wards and operating rooms are supplied with every device for the care and comfort of the sick and injured. Two electric-lighted modern automobile ambulances are a part of the equipment. The staff of the hospital consists of three visiting and two resident physicians. There are six nurses in attendance. The hospital is for emergency cases only and all patients are transferred to other institutions when this can be done with safety.

From the opening of the institution, February 18, 1914, to the end of the present fiscal year 5,071 patients have been cared for, 4,400

of whom have been admitted within the last 12 months. During the period of construction 85 per cent of the cases were surgical, but at the present time the medical cases largely predominate, and the majority of admissions since the exposition was opened are of patients suffering from transient ailments or less serious injuries. Histories of all cases treated are kept, together with X-ray plates and other clinical evidence, forming part of a card-index system. At the close of the exposition it is contemplated to submit a report in which all diseases and injuries treated will be systematically tabulated.

Not the least of the benefits derived from an institution of this character are the attention and interest of visiting physicians, as well as the education of the public in improved methods for the care of the sick and injured.

SANITARY WORK AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION.

Under authority of the Secretary of the Treasury dated March 3, 1913, an officer of the service was directed to confer with the officials of the Panama-Pacific International Exposition with the object of supervising the sanitation of the exposition grounds and buildings. Considerable work was accomplished during the preexposition period. Ordinances passed by the city of San Francisco gave special powers to the exposition company in connection with building requirements, police and fire control, and sanitation, and such additional authority was delegated by the city health department as was necessary to give the service direct and complete control of all sanitary matters.

Surg. John D. Long, who was first assigned to the work, was transferred to the Philippines in October, 1914, and from that date to January, 1915, questions of sanitation were referred to Surg. R. M. Woodward, of the Exposition Emergency Hospital, or to Passed Asst. Surg. J. R. Hurley, in charge of the field work in California. On January 27, 1915, Senior Surg. C. C. Pierce, in charge of the service exhibit at the exposition, was directed to assume these duties. Authority was granted to Senior Surg. Pierce to employ two sanitary inspectors, whose salaries were to be paid from the exposition funds. An office was opened on the grounds and daily inspections inaugurated.

INSPECTION OF EMPLOYEES.

A complete census was taken of all persons on the exposition grounds, showing age, sex, and occupation of each. Regulations were enforced requiring residents of concessions to be vaccinated against both smallpox and typhoid. Of the 401 inhabitants 339 were given typhoid vaccine and 26 were inoculated against smallpox.

Examinations for hookworm and trachoma were required, and persons found suffering from either infection were treated and instructed concerning precautionary measures. Persons infected with tuberculosis or venereal disease were debarred from handling food. Notification of all cases of illness was required, and the following diseases were reported, no secondary cases developing: Diphtheria and diphtheria-bacillus carrier; scarlet fever; mumps; chicken pox; measles; scabies; trachoma; hookworm; tuberculosis; vermin infestation.

INSPECTION OF PREMISES.

Toilets and baths were regularly inspected to determine if they were adequate in number and maintained in a sanitary condition. Sleeping quarters were also inspected, the number of occupants recorded, the cubic feet of air space determined, the amount of light and ventilation, and the absence or presence of vermin. Kitchens and dining rooms were regularly visited to ascertain the degree of cleanliness, the care of dishes and cooking utensils, the disposal of wastes, and the healthfulness of employees. The number of premises so inspected to date has been 3,912.

GARBAGE DISPOSAL.

All garbage within the exposition grounds has been handled in approved covered cans, which were collected daily and steamed after being emptied. Garbage was segregated, empty tins and bottles, dry trash, broken boards, etc., being kept separate from kitchen refuse and waste food products. A garbage-reduction plant and incinerator were installed on the grounds by a private company as a working exhibit and handled all material of that nature. Grease for candle and soap making and a fertilizer base were secured from the treated garbage, no effort being made to salvage the dry organic waste.

WATER SUPPLY.

The exposition company established its own water-supply plant in Golden Gate Park. Installation of the filters and chlorine treatment plant was accomplished under the direction of Prof. Charles Gilman Hyde, of the University of California, but the operation of the plant was controlled by frequent bacteriological examination of the effluent at the service laboratory in San Francisco. The plant consists of six driven wells, a sump, rapid-sand filters, clear-water wells, chlorine treatment apparatus, a pumping station, and a reservoir at the Presidio Military Reservation.

STEREOPTICON LOAN LIBRARY.

The collection of lantern slides of this service was established primarily for the use of officers, but requests from scientific organizations and health workers became so numerous that almost immediately a much larger circulation developed. At present the library consists of over 2,500 views, the total number of slides on file being in excess of 8,000. This is believed to be the largest collection of stereopticon slides used for health purposes extant. The majority of the illustrations have been obtained from actual service operations, but other sources have also been drawn upon. The views are classified according to subjects, and the numerous aspects of such diseases as pellagra, uncinariasis, tuberculosis, trachoma, etc., are considered. For example, the slides relating to typhoid fever show the prevalence of the disease, the insanitary conditions which are responsible for its spread, the pollution of wells and other water supplies, the rôle of flies in the dissemination of the infection, the economic loss

entailed, and the measures to be instituted for its prevention. It has been the aim in dealing with each subject to picture both proper and improper conditions. The field of medicine, and that of preventive medicine particularly, offers exceptional opportunities for demonstrations of this character.

At present the slides are loaned for use in clean-up campaigns, for scientific instruction in epidemic work, and for health propagandas. The number in constant circulation exceeds 1,000, and the yearly circulation is more than 12,000, the demand far exceeding the supply.

In addition to the stereoptican slides, motion-picture films of service operations, clean-up campaigns, and disease-prevention work have been loaned to various organizations.

SANITARY REPORTS AND STATISTICS.

The work of the division of sanitary reports and statistics during the year has been of special importance because of its essential relation to the control of disease, the advancement of public health administration, and the improvement of sanitary conditions in general throughout the United States.

FUNCTION.

The function of the division of sanitary reports and statistics is (1) to collect sanitary information essential to the work of the Public Health Service or necessary to State and municipal health administration, (2) to compile in statistical form sanitary data which can in this way be made more useful, and (3) to publish for the information of health authorities and others engaged in public health work such of the collected sanitary information and statistics as will be of assistance in their work. In the division are prepared the Public Health Reports, which are published weekly, the supplements to the Public Health Reports, and reprints.

Through this division is collected current information as to where communicable diseases are present throughout the United States and where cholera, plague, yellow fever, smallpox, and typhus fever are present throughout the world. Copies of the laws and regulations being enacted or adopted by State and municipal authorities for the safeguarding of the public health are secured, that information may be available concerning the legislative action being taken to safeguard the public health and that the laws and regulations adopted by each State and city may be available to all health authorities and the trend of health legislation, administration, and practice may be known.

SUMMARY OF ACTIVITIES DURING THE YEAR.

Current information of the relative prevalence and geographic distribution of preventable diseases throughout the United States has been collected in so far as information on the subject was obtainable, either through the activities of officers of the Public Health Service or through the records of State and local health authorities. Although a knowledge of the occurrence of a disease is necessary to its control, and no health department, Federal, State, or local, can effectively prevent or control a disease without knowledge of when, where, and under what conditions it is occurring, records of the occurrence of diseases and the collection of data as to their prevalence are being made only by the most efficient of the State and municipal health departments. It is probably true that even an understanding and appreciation of the suffering and loss being caused by diseases

and of the advantages of and need for their control will be made possible only as a result of definite knowledge of their prevalence.

During the year a special effort has been made to collect current data relative to pellagra, smallpox, tuberculosis, cerebrospinal meningitis (cerebrospinal fever), diphtheria, erysipelas, gonorrhea, malaria, measles, plague, pneumonia, poliomyelitis (infantile paralysis), Rocky Mountain spotted fever, scarlet fever, syphilis, tetanus, typhoid fever, and typhus fever.

For the purpose of preventing the introduction of dangerous epidemic diseases from abroad careful attention has been given to the ports and places in foreign countries in which such diseases were present, the extent of their prevalence, the measures taken for their control, and the existing routes by which their importation into this country would be possible.

Cognizance has been taken of sanitary legislation adopted by States and cities. Regulations, laws, and ordinances affecting or having for their purpose the protection of the public health have been obtained as soon after their adoption as possible; published currently for the information of the health officers and health workers of the country; and, classified according to the particular matters in public health administration to which they relate, compiled and published by calendar years for the purpose of convenient reference.

The decisions of the courts of last resort in the several States relating to public health laws or to matters affecting the public health have been watched, collected, and published for the information of those interested. These court decisions are of special importance, as they show the application of the laws and the construction placed upon them.

PUBLIC HEALTH REPORTS.

The Public Health Reports have been issued weekly pursuant to the acts of Congress approved February 15, 1893, and August 14, 1912. During the year the editions have averaged 72 pages. The average amount of matter published in each issue has slightly increased. The Reports have been sent to State health officers, members of State boards of health, officials in State departments of health, members of municipal and county boards of health, local health officers, and officials in local health departments. Copies have also been sent upon request to persons interested in public-health work and identified with organizations, associations, or clubs actively interested in the control of disease and the protection of health.

In the Public Health Reports the nature and trend of public health legislation and of court decisions relating to public health laws have been made currently available to the health officers and health workers of the country.

There has also been made available information of the occurrence in the United States of epidemics of diseases dangerous to the public health and of the current prevalence and geographic distribution of diseases which, because possible of control, should be controlled. The facts regarding the occurrence of dangerous epidemic diseases in foreign countries were likewise made available to quarantine officers and others whose duty it is to prevent the introduction of such diseases into the United States. This information makes it

possible for quarantine officers to effectively prevent the importation of such diseases from infected foreign ports without placing burdensome restrictions upon commerce.

The Public Health Reports have also contained other matter of interest to health officers, such as reports on methods of health administration and articles dealing with the control of disease. Supplements to the Public Health Reports have been issued as separates. These supplements contain discussions of general interest in regard to the preservation of health and the control of disease and were issued for distribution to the public in general, their purpose being particularly educational.

EDUCATIONAL SUPPLEMENTS.

There were eight supplements issued during the year. Their combined editions aggregated 84,000 copies. Their educational purpose and nature may be judged from the titles, which are given under the chapter "Publications" in this report.

REPRINTS.

Many of the articles which appear in the Public Health Reports are of such a nature that a wider distribution of them is desirable. These articles are reprinted in the form of separates to avoid the unnecessary expense of printing larger editions of the Public Health Reports themselves. Their issue in reprints makes possible the satisfying of an extensive demand for them, which otherwise could not be met. Eighty reprints of this nature have been issued, the aggregate of the editions totaling 659,500 copies. For further information regarding reprints and their titles see chapter on "Publications."

SANITARY LEGISLATION.

The nature and effect of legislation relating to the public health adopted by States and cities have been kept under observation, and the trend of sanitary legislation has been studied and, where opportunity offered, guided into channels of practicability and proven efficiency. Copies of municipal ordinances and regulations and of State laws and regulations pertaining to the public health have been obtained currently as adopted by the several States and cities. Information of the trend of sanitary legislation and of the nature of the laws and regulations being adopted has been made available to State and local health authorities and legislative bodies by the publication of the text of such laws currently in the Public Health Reports. In this way all persons interested in public health legislation and administration have been able to keep advised regarding the legislative action and administrative practices throughout the country. It has made possible a helpful criticism of these laws and regulations and the gradual selection of those most suited to accomplish the purpose for which they are intended. With the copying and adoption of the better-drafted laws and regulations the effect has been a marked tendency toward uniformity in legislation.

STATE HEALTH LAWS AND REGULATIONS.

The observation, collection, and publication in the Public Health Reports of State health laws and regulations dates back to July 1, 1911. During the past year the State laws and regulations to December 31, 1914, have been compiled and classified in three volumes, one containing the laws and regulations adopted from July 1, 1911, to December 31, 1912, one including the laws adopted during the calendar year 1913, and one those adopted during the calendar year 1914.

The following is a brief discussion of the more important legislation adopted during the year ended June 30, 1915:

STATE HEALTH ORGANIZATIONS.

During the fiscal year ended June 30, 1915, the health departments of Massachusetts, New Jersey, West Virginia, and the Philippine Islands were reorganized.

Massachusetts.—The Massachusetts Department of Health has replaced the former "board of health." The executive officer is the commissioner of health, who is appointed by the governor for a term of five years. He must be a "physician skilled in sanitary science and experienced in public health administration." His salary is \$7,500 per annum.

The public health council consists of the commissioner of health and six other members, who are appointed by the governor for three-year terms. The members receive "\$10 a day while in conference and their necessary traveling expenses while in the performance of their official duties." It is the duty of the public-health council to "make and promulgate rules and regulations; to take evidence in appeals; to consider plans and appointments required by law; to hold hearings; to submit annually to the general court, through the governor, a report, including recommendations as to needed health legislation; and to discharge other duties required by law," but it has no administrative or executive functions.

The State is divided by the commissioner of health into eight health districts, with a health officer in charge of each district. (Public Health Reports, Oct. 30, 1914, p. 2941.)

New Jersey.—The New Jersey act provides for a department of health governed by a board of eight members, appointed by the governor for four-year terms. Three of the members must be physicians, one a veterinarian, and two sanitary engineers.

The executive officer is the director of health, who is selected by the board. He must be a resident of the State of New Jersey, skilled in sanitary science, and must have had "actual experience in an administrative or executive capacity in some well-organized department of public health." His term of office is four years, and the salary \$5,000 per annum.

The department is required to enact a State sanitary code, embodying rules and regulations "the observance of which, in its opinion, will promote health and prevent disease." It is given power to enforce the laws of the State and the sanitary code in localities where, after notice, the local authorities fail to enforce them.

The board is required to codify the various laws of the State of New Jersey relating to the health of the people, and to continue the

work from year to year "with the idea of preserving in concrete form the history and development" of the department of health of the State, "and contributing materially to a better and more comprehensive understanding of all laws relating thereto." (Public Health Reports, July 16, 1915, p. 2139.)

West Virginia.—The State of West Virginia has also substituted a department of health, with a commissioner of health and a public-health council, for its State board of health. The law establishes two divisions in the department, one of preventable diseases and the other of sanitary engineering, with a director in charge of each division.

One provision of the law authorizes the commissioner of health, when in the opinion of the public health council any local health authority fails or refuses to enforce necessary laws and regulations to prevent the spread of diseases, to enforce the rules and regulations of the State department of health within the territorial jurisdiction of such local health authority. The public health council is also authorized to remove from office any local health officer who refuses to carry out the lawful orders and regulations of the council. (Public Health Reports, Apr. 9, 1915, p. 1119.)

Philippine Islands.—The bureau of health of the Philippine Islands has been superseded by the "Philippine Health Service," under the direction of a director of health and a council of hygiene. The act took effect July 1, 1915. (Public Health Reports, May 7, 1915, p. 1415.)

MORBIDITY REPORTS.

A large number of laws relating to morbidity reports have been adopted within the last few years. This is an indication that members of legislatures and others interested in the welfare of communities realize the importance of prompt notification of cases of communicable diseases in order that measures may be taken to prevent their spread.

During the calendar year 1913 more than half of the States of the Union adopted or amended laws or regulations requiring that cases of controllable diseases be reported to the health authorities. (Reprint No. 264 from the Public Health Reports.)

The State Board of Health of Ohio on October 21, 1914, adopted nearly all the provisions of the model law for morbidity reports in the form of a regulation. (Public Health Reports, Nov. 6, 1914, p. 3007.)

During the fiscal year ended June 30, 1915, the Legislatures of Maine and Michigan amended the laws of those States requiring the notification of cases of communicable diseases. (Public Health Reports, Apr. 30, 1915, p. 1365, and June 18, 1915, p. 1853.)

Regulations providing for the reporting of communicable diseases were adopted in Delaware (Public Health Reports, Apr. 16, 1915, p. 1201) and in Illinois (Public Health Reports, June 4, 1915, p. 1723).

Additions to the lists of notifiable diseases were made in Louisiana, Montana, Porto Rico, and Vermont.

An amendment to the Massachusetts law requires more complete records to be kept by local health officers of cases reported to them,

and the New York Sanitary Code makes provisions for morbidity reports.

CONTROL OF COMMUNICABLE DISEASES.

Among the many legislative measures adopted during the fiscal year ended June 30, 1915, for controlling communicable diseases, the following may be noted:

Tuberculosis.—The Legislature of Michigan appropriated \$100,000 for the purpose of making a tuberculosis survey of the State and carrying on antituberculosis work. The money is to be expended during the fiscal years ending June 30, 1916, and June 30, 1917. (Public Health Reports, June 18, 1915, p. 1853.)

In Minnesota provision was made for the employment by the State forester of patients from the State tuberculosis sanatorium who are able to work. Counties or groups of counties are authorized to establish tuberculosis sanatoria. The law gives detailed instructions for the establishment and maintenance of such county sanatoria. (Public Health Reports, June 25, 1915, p. 1965.)

Indiana adopted a law extending the requirements for notification of cases of tuberculosis and requiring disinfection after the termination of each case. (Public Health Reports, May 28, 1915, p. 1657.)

Plague.—The outbreak of plague in New Orleans resulted in regulations in Louisiana and Mississippi intended to prevent the spread of this disease by vessels. (Public Health Reports, Apr. 9, 1915, p. 1116; Aug. 28, 1914, p. 2277.) The State of Texas appropriated \$25,000 to be used in preventing the introduction of plague. (Public Health Reports, Apr. 16, 1915, p. 1214.)

Spread of diseases by dairy products.—The Legislature of Maine passed an act authorizing the State board of health to prohibit the sale of milk or other dairy products from any place where contagion exists. (Public Health Reports, Apr. 30, 1915, p. 1362.)

Venereal diseases.—The Legislature of Vermont passed an act intended to prevent the spread of venereal diseases. The act makes it a crime for any person knowing himself to be afflicted with gonorrhea or syphilis to marry or to have sexual intercourse with another person. Physicians are required to report cases of venereal diseases, and the State board of health is required to make and enforce regulations for the quarantining and treatment of cases of gonorrhea and syphilis. (Public Health Reports, Apr. 16, 1915, p. 1214.)

Communicable diseases generally.—The State Board of Health of Delaware adopted general rules for the reporting of cases, placarding and quarantining of cases of communicable diseases, and for terminal disinfection. (Public Health Reports, June 4, 1915, p. 1723.)

The Illinois State Board of Health also adopted regulations for the control of communicable diseases, and specific regulations for cases of smallpox, scarlet fever, measles, and diphtheria. (Public Health Reports, Apr. 30, 1915, p. 1357 et seq.; June 4, 1915, p. 1723 et seq.)

The laws of Maine relating to the control of communicable diseases were amended. (Public Health Reports, Apr. 30, 1915, p. 1365.)

Ophthalmia neonatorum.—The Legislature of the State of Louisiana passed an act requiring the notification of cases of ophthalmia neonatorum and making it the duty of local health officers to investigate each case. The State board of health is authorized to promulgate rules and regulations for the prevention of ophthalmia neonatorum

and to provide for the gratuitous distribution of a prophylactic. (Public Health Reports, Oct. 30, 1914, p. 2933.)

An Oregon act requires that cases of inflamed, swollen, or reddened eyes in infants within two weeks after birth shall be reported within 24 hours to the local health officer, who is required to notify parents of the danger and instruct them as to the proper treatment. (Public Health Reports, Apr. 30, 1915, p. 1369.)

SCHOOLS.

Medical inspection of school children.—A regulation of the Territorial Board of Health of Hawaii adopted February 11, 1915, requires that "teachers and scholars in all public and private schools" shall provide themselves each year with physicians' certificates as to their freedom from any communicable disease. School physicians are to examine teachers and pupils not provided with certificates. (Public Health Reports, June 11, 1915, p. 1803.)

The Legislature of the State of Vermont passed an act providing for medical examination of school children, provided the voters of the county, city, or incorporated district vote for such inspection. (Public Health Reports, May 14, 1915, p. 1459.)

A North Dakota act authorizes boards in charge of schools to provide for the medical inspection of school children "at least once annually." (Public Health Reports, June 4, 1915, p. 1730.)

A regulation promulgated in Porto Rico August 28, 1914, requires that every child upon enrollment "in the public and private schools and asylums" must present a certificate "as to his indemnity respecting trachoma." All school children are to be examined in January and April of each year. (Public Health Reports, Oct. 9, 1914, p. 2739.)

Communicable diseases.—A regulation of the State Board of Health of Mississippi makes it unlawful to employ in any school or other public or private institution any teacher, janitor, or other person suffering from a communicable disease. (Public Health Reports, Nov. 27, 1914, p. 3231.)

Vaccination.—A law passed by the New York Legislature prohibits the admission of any unvaccinated child into schools in any of the larger cities. In smaller places unvaccinated children must be excluded from school when the State commissioner of health certifies to the school authorities that smallpox exists in the "city or school district or in the vicinity thereof." Vaccination must be performed in the manner prescribed by the State commissioner of health. (Public Health Reports, Apr. 23, 1915, p. 1281.)

Dental inspection and treatment.—A board of dental hygiene was established in the Philippine Islands by an act approved February 5, 1915, for the purpose of "furnishing free dental service to the poor children in the public schools of the Philippine Islands * * * and to any and all children attending public and private schools of primary instruction." (Public Health Reports, May 7, 1915, p. 1429.)

The Legislature of the State of Kansas authorized cities having a population of 40,000 or more to provide free dental inspection for school children. (Public Health Reports, May 14, 1915, p. 1457.)

Open-air schools.—An addition to the Indiana law makes it lawful to establish open-air schools. (Public Health Reports, May 28, 1915, p. 1658.)

MUNICIPAL HEALTH LAWS AND REGULATIONS.

Public-health administration in cities and the need for improvement in administrative practices and legislative requirements as regards cities is second in importance only to that of States. In some respects the cities, because of their more compact populations and their relatively greater revenues, have made greater advances in health administration than the States. Progress made in this way by one or more cities serves as a useful model after which other municipalities may pattern, provided they can be made cognizant of the details of such progress.

The observation, collection, and publication in the Public Health Reports of city ordinances and regulations relating to the public health date back to January 1, 1910. Ordinances and regulations adopted from that time to December 31, 1914, have been compiled by calendar years in five volumes.

COURT DECISIONS.

A digest of court decisions relating to morbidity reports was published early in the fiscal year, and will be of material assistance to legislators and others who have occasion to draft laws requiring the reporting of cases of the controllable diseases. The opinions cited show that the courts realize the importance of securing promptly the information on which action for the protection of the public must be based.

OCCUPATIONAL DISEASES AND WORKMEN'S COMPENSATION LAWS.

The Supreme Judicial Court of Massachusetts rendered a number of decisions holding that workmen (or, in case of death, their dependents) were entitled to compensation under the Massachusetts workmen's compensation law, when the injury for which recovery was sought resulted from industrial diseases and not from "accidents" in the usual acceptance of that term.

In one of these cases it was held that blindness resulting from an acute attack of optic neuritis induced by poisonous coal-tar gases is a "personal injury arising out of and in the course of" employment within the meaning of the Massachusetts law providing for compensation for injuries to workmen. (Public Health Reports, June 12, 1914, p. 1583.)

In the next case where this principle was involved the court held that under the workmen's compensation act of Massachusetts the term "personal injury" is not limited to injuries caused by external violence, physical force, or as the result of "accidents" in the sense in which that word is commonly used, but under the statute is to be given a much broader and more liberal meaning, and includes any bodily injury. It includes any injury or disease which arises out of and in the course of the employment and causes incapacity for work. Lead poisoning, according to the Massachusetts act, is therefore a "personal injury" if incurred by the employee during the course of his employment. (Public Health Reports, July 3, 1914, p. 1781.)

A third decision was to the same effect. A cook employed on a lighter was suffering from valvular disease of the heart. The disease was aggravated by his exertions in saving his personal effects when the lighter sank, and he died soon after. The industrial-accident board found that the death of the employee arose out of and in the course of his employment, and the supreme court supported this view. (Public Health Reports, May 19, 1915, p. 1455.)

The Supreme Court of the State of Michigan, on the contrary, decided that occupational diseases were not included within the provisions of the Michigan compensation act. The law differs somewhat from the Massachusetts law, and the justice who wrote the opinion said:

It was not the intention of the legislature to provide compensation for industrial or occupational diseases, but for injuries arising from accidents alone.

In reversing an award made by the industrial accident board of the State to the widow of an employee who died as the result of red-lead poisoning the supreme court pointed out that if it had been the intention of the legislature to include occupational diseases the clause would have been unconstitutional, since the title refers merely to "accidental" deaths and injuries, and Michigan has a constitutional provision requiring the title of any law fully to express the object of the law. (Public Health Reports, Nov. 6, 1914, p. 2999.)

VENEREAL DISEASES AND THE REGULATION OF MARRIAGE.

The Wisconsin "eugenics law," which took effect January 1, 1914, excited much comment. The law requires each male applicant for a marriage license to secure a physician's certificate that he is free from venereal diseases. The decision of the Wisconsin Supreme Court upholding this law may be important, as it establishes a precedent which may serve as a guide in framing other laws intended to prevent the spread of venereal disease or to safeguard marriage.

So significant is the Wisconsin decision that a summary of it follows: The power of the State to control and regulate by reasonable laws the marriage relation, and to prevent the contracting of marriage by persons afflicted with loathsome or hereditary diseases, which are liable either to be transmitted to the wife or inherited by the offspring, or both, must on principle be regarded as undeniable. When the legislature passes a constitutional law that law establishes public policy upon the subjects covered by it, and that policy is not open to question by the courts. Legislation requiring a certificate of health from males before a marriage license is issued and making no such requirement as to females is not unreasonable nor so discriminatory as to render the law unconstitutional. Under a law requiring a certificate from a physician that a "person is free from acquired venereal diseases so nearly as can be determined by physical examination and by the application of recognized clinical and laboratory tests of scientific search," the tests referred to are the tests recognized and used by the persons who are to make them, and it is not necessary for the physician to apply the Wassermann test. This test is elaborate and could not be performed for the prescribed fee of \$3. (Public Health Reports, Sept. 11, 1914, p. 2391.)

OWNERS OF TENEMENTS REQUIRED TO FURNISH GARBAGE CANS.

The Wisconsin Supreme Court also upheld a law requiring owners of apartment houses, tenement houses, and lodging or boarding houses to furnish suitable covered receptacles for garbage, ashes, and refuse. The court declared that the State in the exercise of its police power had the right to pass reasonable health regulations, and that it was only where the power to regulate had been clearly abused that courts would declare the manner of using this power unconstitutional. The court also said that one provision of a law, which would be valid if left standing alone, should not be held to be void because some other provision of the same law, dealing with a different subject, may be invalid. (Public Health Reports, Sept. 18, 1914, p. 2955.)

MEAT INSPECTION—CITY ORDINANCES VALID.

City ordinances requiring the inspection of meat which is to be sold in the cities adopting the ordinances were held valid by the courts of New Jersey and Maine. In the former case it was held that the fact that the plaintiff held a license from the State board of health authorizing him to slaughter animals did not authorize him to sell the meat from those animals in the city without complying with the city ordinance. The ordinance held valid provided that meat sold in the city must be examined by an inspector before and after slaughter. The Maine ordinance, also upheld by the supreme court of that State, requires the inspection of carcasses when the meat is to be sold. (Public Health Reports, Aug. 14, 1914, p. 2149; Sept. 18, 1914, p. 2456.)

PHYSICIAN'S SERVICES DURING EPIDEMICS—COMPENSATION.

The Supreme Court of Nebraska rendered two decisions holding that during epidemics physicians acting under orders from the State board of health or county boards of health are entitled to extra compensation for unusual services. (Public Health Reports, Aug. 14, 1914, pp. 2151 and 2153.)

HABIT-FORMING DRUGS—SALE OF.

The Georgia Court of Appeals held that testimony of cocaine users that the drug had been purchased from the defendant on several occasions is sufficient to sustain a verdict of guilty which was rendered by the jury, although the analysis of a sample purchased for the purpose of securing evidence failed to show any trace of cocaine. The court declared that there was no hard and fast rule requiring that the nature of a drug should be proved by chemical analysis and not otherwise. (Public Health Reports, Aug. 14, 1914, p. 2154.)

Another decision concerning habit-forming drugs was made by the Kentucky Court of Appeals, which held that in an indictment for violation of a statute which prohibits the sale of "opium or its alkaloidal salts or their derivatives" it is sufficient to charge that the defendant sold "morphine." According to the court, the Kentucky law of 1913 prohibiting the sale of opium or its alkaloidal salts or their derivatives for any purpose other than for "legitimate use" is sufficiently definite to be enforceable and valid. (Public Health Reports, Jan. 1, 1915, p. 53.)

TUBERCULIN TESTS OF DAIRY COWS.

That the requirement that the cows used in dairy business where milk is sold generally to the people should be inspected as to their health twice during the year does not violate the constitution of Mississippi nor section 1 of the fourteenth amendment to the Federal Constitution was the view in a decision handed down by the Supreme Court of Mississippi during the year. The court also declared that the purpose of such a regulation was to prevent the spread of disease among human beings, and that therefore its promulgation and enforcement by the State board of health rather than by the live stock sanitary board was proper. (Public Health Reports, Apr. 9, 1915, p. 1111.)

ANT POISON—SALE OF.

The California act of 1913 relative to the sale of ant poison was construed by the California District Court of Appeals, second district, as prohibiting the sale of ant poison containing arsenic except by registered pharmacists. In one section the act included ant poison among articles which could be sold by grocers and dealers generally without restriction, but in another section the sale of ant poison containing arsenic or certain other poisons was limited to licensed pharmacists. (Public Health Reports, June 18, 1915, p. 1851.)

THE MODEL LAW FOR MORBIDITY REPORTS.

The Thirteenth Annual Conference of State and Territorial Health Officers with the United States Public Health Service, held at Washington, D. C., June 13, 1915, adopted a number of amendments to the model State law for morbidity reports.

The first section of the law was changed to provide a bureau of preventable diseases in the State department of health instead of a bureau of sanitary reports. The reason for ascertaining through reports of cases where disease exists is to enable measures to be taken for preventing the occurrence of other cases, and the conference deemed it advisable to have the reports of disease go to that branch of the health department to the work of which they are essential and in which they will be used.

The conference inserted a note suggesting that no disease be made notifiable which the State department of health does not intend to control.

The law was changed by the conference so as to require reports to be made to local health officers within six hours instead of "immediately." The requirement that all cases shall be reported in writing by physicians was changed so as to allow the use of the telephone in making reports.

Owing to a decision of the Supreme Court of Ohio that, without compensation, physicians can not be required to conduct investigations in order to secure information required by law, the duty of securing certain data regarding cases of notifiable diseases is imposed upon the local health departments.

A number of changes of minor importance were made for the purpose of making the law more definite and more readily enforceable.

The law was changed so as to require reports to be made by local health officers to the State department of health daily instead

of "within seven days." This will enable State health officers to keep currently informed regarding the prevalence and geographic distribution of diseases.

A new section requires State health officers to send to the Surgeon General of the United States Public Health Service monthly reports showing the number of cases of notifiable diseases reported in the State, and another section, also new, requires telegraphic reports to the Surgeon General of unusual outbreaks or sudden increases in any of the more dangerous communicable diseases. These two sections were added in order that legal authority might be given for making these reports. Many States have for several years been making reports as required by these sections, in accordance with a resolution adopted by the conference in 1912.

The penalty clause was amended to make a second conviction of a physician for failure to report cases of notifiable diseases sufficient cause for revocation of his license to practice medicine, and it is made the duty of the clerk of the court in which conviction is had to notify the proper board in order that action may be taken.

One note added to the model law calls attention to the fact that in cases in which the model law can not expediently be adopted by a State at the present time it is applicable with but slight modification to the needs of cities or other sanitary units in the State. Another note states that "in some States it may be necessary, owing to constitutional requirements, to change the title of the model law or to include the provisions of section 14 in a separate act." This note refers to constitutional provisions limiting acts to a single subject and requiring that all subjects treated shall be expressed in the title of each act.

The law as amended by the conference was published in the Public Health Reports, and has been issued as a reprint, No. 285.

Since the original model law was recommended by the Eleventh Annual Conference of State and Territorial Health Officers with the United States Public Health Service, June 16, 1913, laws or regulations requiring reports of cases of preventable diseases have been adopted or amended in a large number of States. In some instances the model law has been adopted or its principal provisions have been incorporated into acts or regulations, and in many other instances the laws and regulations show plainly the influence of the model law. It appears that in some States the framers of the laws did not consider that public opinion was sufficiently advanced to render it advisable to introduce the model law as a whole, but even in these States some of its provisions have been included.

The city of Spokane, Wash., has adopted nearly all the provisions of the model law in the form of an ordinance.

PREVALENCE AND GEOGRAPHIC DISTRIBUTION OF CONTROLLABLE DISEASES IN THE UNITED STATES.

There can be no effective control of disease in the absence of knowledge as to whether the disease is present in a given jurisdiction, and, if present, the places and conditions under which it occurs. It is only by having such information of the occurrence of a disease that a health department can intelligently or with hope of success attempt to control it and prevent its spread. Without such information of

the occurrence of disease, of its relative prevalence, and of the places and conditions under which it occurs, the health officer is groping blindly. Most of his efforts will be fruitless and the expenditures of his office wasted. Economy and efficiency in health administration are inseparable from a definite knowledge of the places and conditions under which cases of controllable diseases are occurring, as obtained through the reports of cases of these diseases made by practicing physicians.

To fulfill the duties imposed by sections 3 and 4 of the act approved February 15, 1893, in regard to the collection of current information relative to the health conditions throughout the country and the prevention of the interstate spread of "contagious or infectious diseases" an effort has been made to get prompt information of the occurrence of epidemics and to collect data regarding the prevalence and geographic distribution of communicable diseases in so far as State and local health departments had knowledge of the prevalence of these diseases in their respective jurisdictions. The duty of being watchful as regards the local occurrence of dangerous diseases has been imposed upon all service officers, who are required to report on the subject regularly.

SOURCES OF INFORMATION.

Service officers.—All medical officers of the Public Health Service on duty in the continental United States are required by regulation to report to the Surgeon General immediately by telegraph the first occurrence, or reported occurrence, of cases of cholera, yellow fever, plague (human or rodent), typhus fever, or Rocky Mountain spotted fever, or of the appearance of an unusual outbreak or sudden increase in the number of cases of smallpox, typhoid fever, scarlet fever, epidemic poliomyelitis, diphtheria, or epidemic cerebrospinal meningitis, or any other communicable disease dangerous to the public health at or in the vicinity of the places at which they may be stationed. These telegraphic reports are to be followed by letters giving all known details of the epidemics or outbreaks, including the probable source of infection and the measures being taken to control the disease. Subsequent telegraphic reports are required to be made weekly on Monday, giving information regarding the progress of the respective outbreaks and the number of new cases and of deaths.

State health departments.—Pursuant to a resolution adopted by the Tenth Annual Conference of State and Territorial Health Authorities with the Public Health Service, held in Washington, June 1, 1912, certain State health departments furnish monthly reports of the occurrence of notifiable diseases within their respective States as shown by data in their official records.

Municipal health departments.—Blanks have been distributed to the departments of health of cities in which records are kept of the occurrence of disease. These cities report weekly the number of new cases reported and the number of deaths from the several communicable diseases. The blank is in the form of a postal card. The arrangement and style of the record side of the blank is shown here-with, the reverse being used for the address.

MUNICIPAL WEEKLY MORBIDITY REPORT.

City.....

For the week ended Saturday....., 191

DISEASE.	New cases notified.	Deaths.
Smallpox.....		
Typhoid fever.....		
Meningitis (epidemic cerebrospinal).....		
Poliomyelitis (infantile paralysis).....		
Diphtheria.....		
Measles.....		
Scarlet fever.....		
Tuberculosis.....		
Erysipelas.....		
Hookworm disease.....		
Leprosy.....		
Malaria.....		
Mumps.....		
Pellagra.....		
Pneumonia (lobar).....		
Rabies.....		
Tetanus.....		
Typhus fever.....		
Whooping cough.....		
Total deaths from all causes including the above-named diseases.....		

Date mailed....., 191

(Signature).....

Health Officer.

Report for each week should be mailed not later than the following Tuesday.

RECIPROCAL NOTIFICATION BY STATES.

The State of Minnesota has continued to notify the health departments of other States whenever there occurs in the State of Minnesota a case of communicable disease which apparently had its origin in some other State. The health department of the State in which the disease had its origin is notified of the facts in regard to the case. Whenever a person leaves the State while he is convalescing from a communicable disease with the possibility present that he may be a carrier of the disease with which he was affected or from which he is convalescing, the Minnesota State department of health reports the facts to the department of health of the State to which the person is going. No other State has as yet followed the example set by Minnesota. In the United States the control of disease must be based upon the active and sincere cooperation of the several State departments of health, and one of the factors in such cooperation is reciprocal notification similar to that so commendably inaugurated by the health department of Minnesota.

DENGUE.

During the year 12 cases of dengue, with 4 deaths, were reported in Hawaii. Of these, 2 were reported in January, 1 in February, 2 in April, 3 in June, 1 in August, 1 in September, 1 in October, and 1 in December.

DIPHTHERIA.

Diphtheria is present during most of the year in practically all sections of the country. It is a disease with characteristics which makes its control at times easy and at times difficult. In diphtheria antitoxin we have an agent which acts both as a cure to the sick and a prophylactic to those exposed to the infection. On the other hand, the almost constant presence of a few diphtheria carriers in a community, and at times their presence in considerable numbers, complicates exceedingly the control of the disease.

Of the States having health departments which attempted to secure information of the prevalence of disease within their jurisdictions for the calendar year 1914, the highest reported case rate was that for New Jersey, with a rate of 2.62 per 1,000 inhabitants. The next highest rates were in New York and Connecticut, with rates of 2.27 and 2.21, respectively. The lowest reported rates were in Wyoming, Porto Rico, and the Philippine Islands. The disease is very rare in the Philippine Islands, and does not seem to be usually present to any great extent in the Tropics.

Of the cities of over 100,000 population, the highest reported case rates were in St. Louis, New Orleans, and St. Paul, with reported case rates of 4.77, 4.64, and 4.17, respectively, per 1,000 population. The lowest reported rates were in Tacoma and Seattle, Wash., and in Nashville, Tenn. In the group of smaller cities higher case rates were reported. Roanoke, Va., had a reported case rate of 9.16, Leominster, Mass., of 9.12, and Perth Amboy, N. J., of 7.34, respectively, per 1,000 population.

The fatality rate of diphtheria is variously stated in medical literature to have been between 30 and 40 deaths per 100 cases before the introduction of antitoxin and to have been reduced to various figures since the introduction of this remedy. Practically all of these statements have been based upon peculiar or limited observations which in nowise express the facts as they existed or exist generally.

For the year 1914 the highest fatality rates were reported in Arizona, Porto Rico, and Wyoming, with rates of 58.5, 31.3, and 31.2 deaths per 100 cases, respectively. Inasmuch as Wyoming and Porto Rico reported a very low case rate and at the same time a high fatality rate, it is more than probable that their apparently high fatality rates are the result of the incomplete reporting of cases. The Arizona high fatality rate is probably due to the same cause.

The highest fatality rates recorded in the larger cities were in Reading, Pa., Lowell, Mass., and Kansas City, Mo., with rates of 17.5, 16.8, and 16.1, respectively, per 100 cases.

As the reported high fatality rates, in most instances at least, undoubtedly indicate merely a deficient reporting of cases, the low fatality rates are of much more interest. The lowest fatality rates were reported in Louisiana, the District of Columbia, and Minnesota, with rates of 6.3, 6.8, and 7.5, respectively, per 100 cases. Among the larger cities the fatality rates were much lower than those of the States. The city of Richmond, Va., had a fatality rate of 1.9; Denver, Colo., one of 2.6; and Hartford, Conn., one of 3. Some of the smaller cities also show low fatality rates. Rutland, Vt., had a fatality rate of 1.1; Auburn, Me., 1.3; and Watertown, N. Y., one of 1.5 per 100 cases.

LEPROSY.

Leprosy is of special interest, not because of its frequency, but because of its infrequency. It is a disease which offers special difficulties in its control because of the lack of knowledge as to the means by which it is contracted. The situation is further complicated by the great dread in which those afflicted with the disease are held by most people.

Seven cases of the disease were reported in California, 2 in the District of Columbia, 60 in Hawaii, 19 in Louisiana, 596 in the Philippine Islands, 9 in Porto Rico, 1 in South Carolina, 1 in Wisconsin, and 1 in Galveston County, Tex. These few reported cases probably represent only a small fraction of those which developed in this country, and without doubt they do not represent all of the recognized cases. So long as the public attitude toward cases of leprosy is what it is, and it will probably continue for some time, and so long as there is no institution or place where those who have been so unfortunate as to contract the disease can go and spend the remainder of their lives in peace and quiet and with such comfort as is possible, just so long will the tendency be for friends and relatives to conceal cases of leprosy and to do everything within their power to prevent the cases being reported to the authorities.

Only two or three States have made provision for the segregation and care of those afflicted with leprosy, and the provisions in those States are not such as to make it an inducement for one affected with the disease to seek their refuge, certainly not until the later and more mutilating stages of the malady have been reached.

Few States have a sufficient number of lepers to warrant any great expenditure for their care. The establishment of a Federal institution where lepers from all the States might be sent has been repeatedly suggested. It would seem that under such an arrangement a greater degree of comfort might be given to these persons and life relieved of many hardships which must otherwise be encountered.

The record of cities shows that one case was reported in Detroit; three in New York; one in Philadelphia; one in Oil City, Pa.; two in St. Louis; five in Los Angeles; two in San Francisco; one in San Diego, Cal.; one in Tacoma, Wash.; and two in Tampa, Fla.

MALARIA.

Malaria constitutes one of the largest and most important public-health problems with which we are confronted. Few diseases will lower the efficiency or affect the prosperity of a community to so great a degree as will malaria. Fortunately the disease is one of those most readily controlled. The means by which the infection is carried is known, and the conditions under which the dissemination and spread of the disease occur have been worked out to a greater extent than is true as regards most other maladies. Naturally, the first step in the control of this disease is the securing of information as to where the disease is present.

At one time malaria was very prevalent in Michigan, Wisconsin, Canada, and the northern parts of Indiana and Illinois. When the

disease was present in these localities undoubtedly many cases of illness due to other causes were ascribed to malaria, ague, and chills and fever. Very probably in the localities to-day where malaria is present the same condition exists and many cases of illness not due to malaria are ascribed to this cause. However, there are probably in these localities an equal number of unrecognized cases of the disease.

No State seems to have made a serious effort to secure reports of the occurrence of malaria, or at least not to have been successful in the attempt, unless perhaps the States of Mississippi and Virginia may be considered to have done so. In California there were 331 cases of malaria reported and 70 deaths from the disease; in Kansas, 8 cases and 25 deaths; in Maryland, 96 cases and 9 deaths; in New Jersey, 718 cases and 10 deaths; in Porto Rico, 395 cases and 613 deaths. The fact that the numbers of deaths are too great for the numbers of cases in California, Kansas, and Maryland is apparent. The fault may be, however, and probably is, at least in part, due to the assignment of incorrect causes of deaths. In Mississippi there were 116,688 cases of malaria with 1,029 deaths registered. In Virginia there were 6,926 cases with 117 deaths registered. In the Philippine Islands there were 19,753 deaths registered.

In the cities there were cases reported as follows:

In Boston, 16; Cleveland, 8; Philadelphia, 20; Newark, N. J., 31; Jersey City, N. J., 3; Camden, N. J., 2; Paterson, N. J., 4; and Richmond, Va., 20.

In other cities deaths were recorded as follows: Baltimore, 6; Chicago, 5; Detroit, 1; New York, 20; St. Louis, 10; Cincinnati, 3; New Orleans, 32; San Francisco, 5; Washington, 3; Kansas City, Mo., 6; Louisville, 2; and Providence, R. I., 1.

MEASLES.

Measles at some time during the year is present in practically all parts of the country. It usually shows an increased local prevalence at intervals of two or three years, the interval being due, presumably, to the time necessary for the development of a new crop of susceptible material. The control of the disease is exceedingly difficult, due in part to the fact that it is frequently so mild that no physician is called, the case being treated at home and not reported, and further to the fact that the time when the disease is spread seems to be limited largely to the early stage, when the malady has the characteristics of a head cold and before its true nature is recognized. Fortunately the disease is relatively mild and the fatalities are comparatively few, although there are without doubt many more cases of bronchial pneumonia and pulmonary tuberculosis following this disease than are usually recognized or shown by the official records. As a rule it is difficult to get cases of this disease reported to the health department. It is being done successfully, however, in a number of States and cities.

The highest reported case rates for measles for the calendar year 1914 were those for the States of Mississippi, Montana, and Colorado, with rates of 9.44, 6.52, and 4.87, respectively, per 1,000 population. The lowest rates among the States reporting were those for New Jersey, Arizona, and the Philippine Islands.

Among the larger cities the rates in some instances were considerably higher than those reported for States, the highest rates for cities of over 100,000 population being those for Indianapolis, Ind., Newark, N. J., and Grand Rapids, Mich., with rates of 19.98, 14.96, and 11.76, respectively, per 1,000 population. The lowest rates, which may possibly mean nothing more than incomplete notification, were those for the cities of Tacoma, Wash., Cincinnati, Ohio, and Louisville, Ky.

In the smaller cities some unusual rates were reported. The rate for Holland, Mich., was 37, of Battle Creek, Mich., 29.8, and of Billings, Mont., 32.1, respectively, per 1,000 population.

Of special interest are the low fatality rates given for some States and cities. There were in the District of Columbia 947 cases, with but 1 registered death, due to the disease. In Utah there were 2,019 cases, with 8 deaths, giving a fatality rate of 0.4 per 100 cases. In Vermont there were 434 reported cases, with 2 deaths, giving a fatality rate of 0.46.

In the larger cities there were in Indianapolis 5,185 reported cases, with 6 registered deaths, giving a fatality rate of 0.12 per 100 cases; in Denver, Colo., 2,674 cases, with 5 deaths, giving a fatality rate of 0.19 per 100 cases. Syracuse, N. Y., had 1,533 reported cases, with 3 registered deaths, giving a fatality rate of 0.2 per 100 cases.

Of the smaller cities, Augusta, Ga., had 573 reported cases, with 1 registered death; East Orange, N. J., 900 reported cases, with but 1 registered death, and Montclair, N. J., 769 cases, with but 1 registered death.

Cases reported, and case and fatality rates, in States in which the prevalence of measles is recorded, 1913 and 1914.

	Estimated population July 1, 1914.	1914				1913			
		Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhab. ants.	Indicated fatality rate per 100 cases.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhab. ants. ¹	Indicated fatality rate per 100 cases.
Arizona.....	239,053	59	11	0.247	18.64	246	212	0.398	26.09
California.....	2,757,895	8,852	150	3.210	1.69	1,796	154	0.673	8.57
Connecticut.....	1,202,688	4,843	146	4.027	3.01	5,362	97	5.363	1.52
District of Columbia.....	355,578	947	1	2.680	1.11	5,713	25	16.413	.44
Hawaii.....	208,063	57	1	.274	1.75	161	1	.859	.62
Idaho.....	395,407					822	6	2.170	.73
Illinois.....	5,986,781	13,295	220	2.221	1.65	33,791	628	5.723	1.86
Indiana.....	2,779,467	^a 12,074	147	4.344	1.22		427		
Iowa.....	2,221,735		30				117		
Kansas.....	1,734,897	3,903	90	2.187	2.31	7,687	54	4.361	.70
Louisiana.....	1,775,482	794	9	.448	1.13				
Maryland.....	1,341,075	2,000	19	1.491	.95	5,352	88	4.023	1.64
Massachusetts.....	3,605,522					28,126		7.926	
Michigan.....	2,976,030	9,177	169	3.084	1.84	9,265	257	3.155	2.77
Minnesota.....	2,213,919	2,460	74	1.111	3.01	5,869	192	2.691	3.27
Mississippi.....	1,901,882	17,967	328	9.447	1.83				
Montana.....	432,614	2,821	16	6.521	.567	2,094	17	4.996	.81
Nevada.....	98,726					434	1	4.582	.23
New Jersey.....	2,815,653	240	(^b)	.085					
New York.....	9,899,761	47,883	832	4.837	1.74	65,070	1,060	6.699	1.63
Ohio.....	5,026,898	16,191	(^c)	3.221					
Oklahoma.....	2,026,534					2,824	119	1.457	4.21
Oregon.....	783,239	3,027	50	3.865	1.65	1,595	12	2.107	.75
Philippine Islands.....	8,650,937	103	418	.012					
Rhode Island.....	591,215	816	60	1.380	7.35		(^d)	1.387	
South Carolina.....	1,590,015	4,230	(^e)	2.660		^a 2,180			
South Dakota.....	661,583	543	8	8.21	1.29	2,411	23	3.749	.95
Utah.....	414,518	2,019	8	4.871	.40	10,820	127	26.734	1.17
Vermont.....	361,205	434	2	1.202	.46				
Washington.....	1,407,865	^a 4,281	49	3.041	1.14	^a 5,290	93	3.934	1.76
Wisconsin.....	2,446,716	6,109	83	2.497	1.36	6,047	113	2.499	1.87
Wyoming.....	168,736	444	6	2.631	1.35	96	7	.588	7.29

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.² For six months only.³ The health officer states that cases are known not to be completely reported.⁴ Exclusive of the city of Baltimore.⁵ Deaths were not reported.

MENINGITIS (EPIDEMIC CEREBROSPINAL).

There has always been considerable difficulty in ascertaining in a satisfactory manner the relative prevalence and geographic distribution of this disease. This is due probably largely to the difficulties of diagnosis and in part to negligence on the part of those whose duty it is to report cases.

The States reporting the greatest number of cases were California, with 70 reported cases; Connecticut, with 31; Illinois, with 196; Indiana, with 72; Kansas, with 31; Louisiana, with 66; Maryland, with 39; Mississippi, with 61; New York, with 440; Ohio, with 201; and Wisconsin, with 75.

Among the larger cities there were 99 cases reported in Chicago, 318 cases in New York, 56 in Boston, and 42 in Cleveland. The disease was reported to some extent from practically all parts of the country.

Cases reported, and case and fatality rates, in States in which the prevalence of meningitis is recorded, 1913 and 1914.

	1914				1913			
	Estimated population July 1, 1914.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhabitants.	Indicated fatality rate per 100 cases.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhabitants. ¹
Alabama.....	2,269,945	8	(³)	0.033	.....	2171	110	0.076
Arizona.....	233,053	70	40	.025	.....	454	42	.468
California.....	2,757,895	31	20	.026	57.14	67	49	.025
Connecticut.....	1,202,088	8	5	.023	64.52	31	23	.026
District of Columbia.....	208,378	9	4	.043	62.50	6	3	.11
Hawaii.....	5,893,781	196	80	.033	44.44	177	6	.031
Illinois.....	2,779,467	72	74	.026	40.82	111	111	.030
Indiana.....	2,221,755	19	31	.017	.....	20	50	.....
Iowa.....	1,754,897	31	(³)	.017	.....	50	54	.....
Kansas.....	1,773,482	66	22	.037	33.33	36	8	.020
Louisiana.....	1,341,075	39	(³)	.029	.....	11	86	.....
Maryland ⁶	3,005,522	21	12	.009	57.14	178	(³) 11	.050
Massachusetts.....	2,213,919	61	13	.032	21.31	218	.....	.008
Minnesota.....	1,901,882	12	65	.....	.....	216	88	.....
Mississippi.....	98,726	446	360	.045	80.717	11	10	.116
Montana.....	9,899,761	201	(³)	.040	.....	333	307	.034
Nevada.....	5,026,898	5	1	.006	20.00	.....	.....	.....
New York.....	783,239	5	79	.012	.....	.....	.....	.....
Ohio.....	8,650,937	19	(³)	.012	.....	32	(³)	.020
Philippine Islands.....	1,590,015	9	46	.....	.....	8	3	.012
South Carolina.....	661,583	12	12	.....	.....	8	38	.....
South Dakota.....	414,518	21	.....	.....	.....	212	35	.....
Utah.....	1,407,865	75	.....	.....	.....	108	411	.....
Washington.....	2,446,716	2	2	.012	100.00	8	11	.....
Wisconsin.....	168,736	.....	.....	.....	.....	.....	.....	.....
Wyoming.....	.....	.....	.....	.....	.....	.....	.....	.....

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.

² The health officer states that cases are known not to be completely reported.

³ Deaths were not reported.

⁴ For six months only.

⁵ Exclusive of the city of Baltimore.

PELLAGRA.

Apparently the prevalence of pellagra has remained undiminished. It is being constantly reported from new localities in which it had not hitherto been recognized. In many sections increasing numbers of cases are being reported. However, neither the reported cases of the disease nor the registered deaths can be relied upon to give even an approximately correct idea of the relative prevalence and geographic distribution of the disease. A large proportion of the cases occurring are being reported in localities where the disease is comparatively rare, while few, if any, cases are being reported in some sections where the disease is prevalent. Nor can the causes of death registered in death certificates be relied upon, in part because of the frequent failure to recognize the disease and in part because a considerable portion of the territory in which pellagra prevails to the greatest extent has unsatisfactory registration of deaths.

In California there were 11 cases and 28 deaths from pellagra reported; in the District of Columbia, 21 cases and 14 deaths. This would indicate very defective notification of cases. In Kansas there were 22 cases reported and 19 deaths, also showing apparently defective notification of cases. In Louisiana there were 115 cases reported and 17 registered deaths; in Maryland, 3 registered deaths; in Michigan, 4 deaths; in Minnesota, 5 deaths; in Mississippi, 10,954 cases and 1,204 deaths, giving a case rate of 5.76 per 1,000 population and a fatality rate of 10.99 per 100 cases. In Oregon there were 3 registered deaths; in Rhode Island, 12; in South Carolina, 448 cases; and in Virginia, 386 cases and 247 deaths. In Virginia the notification of cases was apparently incomplete. The same is true of South Carolina and probably of all the other States, with the possible exception of Mississippi.

PLAGUE.

Although well under control, plague infection has continued to persist during the year to some small extent in California among the ground squirrels, in Seattle in rats, and in New Orleans for a time in man and later in rats.

CALIFORNIA.

Some small amount of plague infection seems still to linger among the ground squirrels in California in certain localities. The dates and localities where infected squirrels have been found since June 30, 1914, are shown in the table on page 307.

Localities in which plague-infected squirrels were found in California from July 1, 1914, to June 30, 1915.

ALAMEDA COUNTY.

Where found.	When found.	Number of squirrels.
	1914.	
W. A. Frederick's ranch, 3½ miles northeast of Sunol. Block 36.....	July 8	1
Frederick's ranch, 4 miles northeast of Sunol. Block 38.....	July 9	1
Frederick's ranch, 4 miles northeast of Sunol.....	July 11	1
Do.....	July 14	2
W. A. Frederick's ranch, 3½ miles northeast of Sunol. Block 38.....	do.....	1
D. Sullivan ranch, 4½ miles east of Sunol. Block 36.....	July 22	1
Do.....	Aug. 7	1
Total.....		8

CONTRA COSTA COUNTY.

	1914.	
Wither's ranch, 4 miles northeast of Lafayette.....	July 1	3
Johnson ranch, 4 miles northeast of Lafayette.....	July 9	1
Silva ranch, 2½ miles west of Moraga, T. 1 S., R. 3 W.....	July 10	1
Hunsackler & Bailey ranch, 3 miles east of Lafayette.....	July 13	1
Silva ranch, 2 miles west of Moraga, T. 1 S., R. 3 W.....	do.....	1
Hunsackler ranch, 3 miles northeast of Lafayette.....	do.....	1
H. Brown ranch, 1 mile north of Lafayette.....	Aug. 1	1
G. Slater ranch, 2½ miles northwest of Walnut Creek.....	Aug. 4	1
J. Lawrence ranch, 1½ miles northeast of Walnut Creek.....	Aug. 11	1
Brookwood Acres, 4 miles northwest of Walnut Creek.....	Aug. 17	1
Moraga Co. land, Moraga, section 13, T. 1 S., R. 3 W.....	do.....	2
Moraga grant, Moraga, section 12, T. 1 S., R. 3 W.....	Aug. 25	1
Brown ranch, 4 miles northwest of Walnut Creek.....	Oct. 23	2
	1915.	
Burgess ranch, 1 mile east of Walnut Creek.....	Mar. 3	1
Walker ranch, 1½ miles east of Walnut Creek.....	Mar. 4	1
Bruno ranch (formerly Geo. Silva ranch), People's Water Co., 7 miles east of San Pablo.....	June 17	2
Baralda ranch, 2 miles northeast of Lafayette.....	June 21	1
Thornton ranch, 4 miles southeast of San Pablo.....	June 25	1
Total.....		23

SAN BENITO COUNTY.

	1914.	
Rancho Paicines, 1 mile west of Paicines.....	July 3	1
D. J. Watson ranch, 9 miles southwest of Hollister, T. 14 S., R. 5 E.....	Sept. 26	1
	1915.	
J. B. McGruey ranch, 3½ miles south of Mulberry.....	Apr. 13	1
C. Watson ranch, 3 miles north of Emmet.....	June 10	1
D. J. Watson ranch, 6 miles south of Hollister, Rancho San Justo, Bird Creek grant.....	June 17	1
Mary Sally estate, 6 miles south of Hollister.....	do.....	1
Mary Sally estate, 5 miles southwest of Hollister.....	June 21	1
Mary Sally estate, Bird Creek district, 4 miles southwest of Hollister.....	June 23	1
Total.....		8

Making a grand total of 39.

NEW ORLEANS, LA.

On June 27, 1914, a case of plague in man was reported in New Orleans, La., in the person of C. N., a native of Sweden, 49 years of age, who had been in the city since June 16. A history of his previous residence was unobtainable. The patient died June 28. The diagnosis was confirmed by necropsy and bacteriological examina-

tion. Other cases followed, and by September 30, 1914, 30 cases of human plague had been reported.

SEATTLE, WASH.

During the month of October, 1907, there were seven reported deaths in man from plague in Seattle. Since then there has been one death, in December, 1913, which may have been due to plague, but, as the body was embalmed before a bacteriological examination had been made, positive evidence regarding the nature of this case was not obtained. No other cases of plague in man have been reported in Seattle. Plague-infected rats have been found in Seattle. As the result of the examination of rats trapped and rats found dead a record of the infected rats found from 1907 to date was published in the Public Health Reports of August 6, 1915.

HAWAII.

In August, 1914, plague was reported at Paauhau, Hawaii. Another case was reported at the same place June 29, 1915.

PHILIPPINE ISLANDS.

In May, 1914, a case of plague was taken from the steamship *Taisang* from Amoy; May 23, a case was taken from the steamship *Linan* from Amoy; June 12 there was another case taken from the steamship *Linan*; June 17 there was a case in the Philippine General Hospital.

There were reported at Manila between May 17 and September 19, 8 cases of plague.

At Cebu there was a case of plague on May 20 from the steamship *Rubi* from Hongkong.

In Manila occasional plague-infected rats were found during the summer of 1914.

POLIOMYELITIS (INFANTILE PARALYSIS).

No large outbreak of this disease was reported during the year except in Vermont, where there were 301 reported cases with 52 registered deaths, giving for the State a case rate of 0.83 per 1,000 population and a fatality rate of 17.3 per 100 cases.

The States in which the largest numbers of cases were reported were California, with 56 notified cases; Illinois, with 142 cases; Indiana, with 58 cases; Michigan, with 49 cases; Mississippi, with 113 cases; New York, with 224 cases; and Ohio, with 63 cases.

Referring to the undue prevalence of the disease in Vermont there was a previous outbreak of the disease in the northeastern part of the State during the summer of 1913. The center of this 1913 outbreak was the town of Hardwick, in the vicinity of which 37 cases of the disease occurred, 17 of these being in the town of Hardwick itself, in a population of 3,500. Late in the 1913 outbreak two cases of the disease occurred in the town of Barton, about 18 miles from Hardwick.

During the latter half of July, 1914, five cases of the disease occurred in the same neighborhood in which the two cases just mentioned were reported, in the village of Barton. From this time the disease spread rapidly in Barton and the neighboring country and extended west and south to other sections of the State. As the disease spread there developed two main epidemic centers, one at Barton and one at Burlington. The first case in the Burlington area occurred August 14 and no connection could be found between it and the Barton focus. On August 14 a case was reported at St. Albans, in Franklin County. On August 23 there was an initial case at Middlesex, in Washington County, and on August 24 a case at Monkton, in Addison County.

In Vermont poliomyelitis is subject to a four weeks' quarantine and terminal disinfection. Contacts are quarantined for two weeks after the last known exposure. At Burlington and Barton all public gatherings in which children participated, including schools, Sunday schools, and moving-picture entertainments, were closed.

Among the cities of the United States reporting the greatest numbers of cases were Chicago, with 53 cases and 10 deaths; New York, with 129 cases and 34 deaths; Boston, with 18 cases; Philadelphia, with 18 cases; St. Louis, with 13 cases; and San Francisco, with 19 cases.

The greatest numbers of cases in proportion to the population were reported in Ann Arbor, Mich.; Haverhill, Mass.; and Lebanon, Pa. At Ann Arbor there were 14 reported cases in a population of approximately 15,000, giving a case rate of 0.94 per 1,000 population. At Haverhill there were 16 cases in a population of 47,000, giving a case rate of 0.34 per 1,000 population, and at Lebanon, Pa., 6 cases in a population of approximately 20,000, giving a case rate of 0.3 per 1,000 inhabitants.

Cases reported, and case and fatality rates, in States in which the prevalence of poliomyelitis is recorded, 1913 and 1914.

	Estimated population July 1, 1914.	1914				1913			
		Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 in-habitants.	Indicated fatality rate per 100 cases.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 in-habitants. ¹	Indicated fatality rate per 100 cases.
Arizona.....	239,053	1	(²)	0.004	.....	90	33	0.033	36.67
California.....	2,757,895	56	26	.020	46.43	29	(²)	.014	.....
Connecticut.....	1,202,688	11	2	.009	18.18	5	(³)	.026	20.00
District of Columbia.....	353,378	8	1	.023	12.50	5	.....	.026	40.00
Hawaii.....	208,063	5	2	.024	40.00	10	.....	.021	18.25
Idaho.....	305,407	.....	.....	.....	.....	126	23	.038	50.00
Illinois.....	5,986,781	142	35	.024	24.65	104	38	.022	36.54
Indiana.....	2,779,467	58	16	.021	48.27	350	28	.051	16.67
Iowa.....	2,221,755	19	13	.009	84.21	90	15	.....	.....
Kansas.....	1,784,897	25	(²)	.014	52.00	.....	.....	.....	.....
Louisiana.....	1,773,482	7	(²)	.004	.....	10	12	.102	.....
Maryland ⁴	1,341,075	12	(²)	.009	.....	362	(²)	.019	55.36
Massachusetts.....	3,605,522	49	28	.016	57.14	56	31	.034	36.49
Michigan.....	2,976,030	19	13	.009	68.42	74	27	.021	20.00
Minnesota.....	2,213,919	113	23	.005	20.35	.....	.....	.027	25.52
Mississippi.....	1,901,882	2	(²)	.005	.....	39	(²)	.004	33.33
Montana.....	432,614	.....	.....	.....	.....	.....	.....	.....	.....
Nevada.....	98,726	32	(²)	.011	.....	73	18	.050	.....
New Jersey.....	2,815,663	224	70	.023	31.25	482	123	.027	25.52
New York.....	9,899,761	63	(²)	.013	.....	3	1	.004	33.33
Ohio.....	5,026,898	.....	.....	.....	.....	8	5	.012	62.50
Oregon.....	783,239	21	(²)	.013	.....	.....	7	.....	.....
South Carolina.....	1,590,015	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota.....	661,583	.....	.....	.....	.....	.....	.....	.....	.....
Utah.....	414,518	.....	.....	.....	.....	.....	.....	.....	.....
Vermont.....	361,905	301	52	.833	17.28	.....	.....	.....	.....
Virginia.....	2,150,009	.....	.....	.....	.....	246	(²)	.116	.....
Washington.....	1,407,865	21	9	.015	42.86	18	9	.013	50.00
Wisconsin.....	2,446,716	31	11	.013	33.48	74	25	.031	33.78

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.

² Deaths were not reported.

³ The health officer states that cases are known not to be completely reported.

⁴ Exclusive of the city of Baltimore.

ROCKY MOUNTAIN SPOTTED FEVER.

During the year 10 cases of Rocky Mountain spotted fever with 7 deaths were reported in Montana, 7 cases with 3 deaths in Oregon, 3 cases with 1 death in Washington, and 9 cases with 4 deaths in Wyoming. The disease is present in a number of other States, but evidently the cases have not been reported.

SCARLET FEVER.

Scarlet fever, like measles and diphtheria, is a disease present in practically all sections of the country. The measures used for its control, the isolation of the sick, and the observation of those exposed appear to be effective in preventing the spread of the disease. The disease seems to be much less common than measles, but is reported with about the same frequency as diphtheria. The fatality rates are, however, considerably lower than those shown by diphtheria records.

The highest reported case rates were those for Minnesota, Utah, and New Jersey, with rates of 2.89, 2.33, and 2.27, respectively, per 1,000 population. The lowest rates were those in the Philippine Islands, Porto Rico, and Hawaii. On the other hand, as the fatality rates of Porto Rico and Hawaii were among the three highest recorded, it is probable that the case notification in these two places was incomplete. Of special interest are the low fatality rates reported in the District of Columbia, Louisiana, and Utah. In the District there were 311 reported cases, with 1 registered death, giving a fatality rate of 0.3 per 100 cases. In Louisiana there were 204 cases, with 2 registered deaths, giving a fatality rate of 0.98 per 100 cases. In Utah there were 968 reported cases, with 13 registered deaths, giving a fatality rate of 1.34.

Among the larger cities the highest case rates were reported in St. Paul, Minn., Pittsburgh, Pa., and Newark, N. J., with rates of 7.1, 6.9, and 4.4, respectively, per 1,000 population. The lowest fatality rates were reported in Washington, D. C., Los Angeles, Cal., and Toledo, Ohio, with rates of 0.32, 0.89, and 0.9, respectively, per 100 cases.

In the smaller cities the highest case rates were reported in Wilkesburg and Sunbury, Pa., and La Salle, Ill., with rates of 11.7, 10.2, and 9.5, respectively, per 1,000 population. In those cities of less than 100,000 population the lowest fatality rates were reported in Lynn, Mass., Decatur, Ill., and East Orange, N. J., with rates of 0.32, 0.57, and 0.61, respectively, per 100 cases.

Cases reported, and case and fatality rates, in States in which the prevalence of scarlet fever is recorded, 1913 and 1914.

	Estimated population July 1, 1914.	1914				1913			
		Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhab-ants.	Indicated fatality rate per 100 cases.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhab-ants. 1	Indicated fatality rate per 100 cases.
Alabama.....	2,269,945	69	9	287	13.04	352	17	0.157	4.83
Arizona.....	239,053	2,831	83	1,027	2.93	227	26	.234	22.22
California.....	2,757,895	1,969	81	1,037	4.11	1,695	85	.635	5.01
Connecticut.....	1,202,688	311	1	.880	3.32	2,499	116	2.115	4.65
District of Columbia.....	353,378	8	1	.038	12.50	556	13	1.597	2.34
Hawaii.....	208,063					14		.073	7.14
Idaho.....	355,407					207	10	.546	4.83
Illinois.....	5,986,781	7,921	403	.007	5.09	14,736	1,020	2.496	6.92
Indiana.....	2,779,467	4,522	110	1.627	2.43	5,071	190	1.837	3.75
Iowa.....	2,221,755	1,074	67	.483	6.24	952	70	1.420	7.35
Kansas.....	1,784,897	854	35	.478	4.10	1,497	37	.849	2.47
Kentucky.....	1,773,482	204	2	.115	.98				
Louisiana.....	1,655	1,655	42	1.234	2.54	822	23	.618	2.80
Maryland.....	6,341,075					8,060		2.271	
Massachusetts.....	3,605,522					4,111		1.400	6.57
Michigan.....	2,976,930	3,162	179	1.082	5.65	3,487	270	1.599	5.19
Minnesota.....	2,213,919	6,403	321	2.892	5.01		181		
Mississippi.....	1,901,882	925	4	.171	1.231				
Montana.....	432,614	701	25	1.620	3.57	940	79	2.243	8.40
Nevada.....	98,726					134		3	2.24
New Jersey.....	2,815,663	6,886	212	2.268	3.79	4,806	208	1.415	4.33
New York.....	9,899,761	18,696	682	1.889	3.65	17,185	831	1.748	4.84
Ohio.....	5,026,898	7,526	(4)	1.497					
Oklahoma.....	2,026,534					922	52	.476	5.64
Oregon.....	783,239	437	13	.558	2.97	660	21	.872	3.18
Philippine Islands.....	8,650,937	2	64	.0002					
Porto Rico.....	1,184,489	3	2	.003	66.66				
Rhode Island.....	591,215	1,082	42	1.830	3.88				
South Carolina.....	1,590,015	207	(4)	.130		123	(4)	.078	
South Dakota.....	661,583	425	11	.642	2.59	6,477	20	.742	4.19
Utah.....	414,518	968	13	2.335	1.343	1,020	15	2.520	1.47

Vermont.....	361,205	406	12	1.124	2.96				
Virginia.....	2,150,009	1,849	39	.860	2.11				
Washington.....	1,407,865	785	22	.558	2.80				3.64
Wisconsin.....	2,446,716	3,194	185	1.305	5.79				6.57
Wyoming.....	168,736	114	6	.676	5.26				9.57
						797	29	.593	
						2,724	179	1.126	
						115	11	.704	

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.

² For 6 months only.

³ Exclusive of the city of Baltimore.

⁴ Deaths were not reported.

⁵ The health officer states that cases are known not to be completely reported.

SEPTIC SORE THROAT.

Eighteen cases of septic sore throat were reported in Maryland, 357 cases with 9 deaths in New York State, and 24 cases in South Carolina.

SMALLPOX.

During the last 15 years smallpox in the United States has practically entered the class of diseases having universal prevalence throughout the country, in which class are included such diseases as scarlet fever, diphtheria, and measles.

During the year 1914 the mild type of the disease has been the prevailing one. Only in a very few outbreaks was the infection of the virulent type. During the year 1914 there were reported in Arizona 7 deaths and 68 cases, in Indiana 7 deaths and over 4,000 cases, in Iowa 10 deaths and over 3,000 cases, in Maryland 5 deaths and 216 cases, in Minnesota 6 deaths and nearly 2,000 cases, in Mississippi 7 deaths and over 1,100 cases, in Montana 5 deaths and 1,200 cases, in the Philippine Islands 430 deaths, and in Virginia 18 deaths and over 3,000 cases. There are no satisfactory records available for the State of Texas, but it is known that there were outbreaks of the virulent type of the disease in the State during the year. The highest reported case rates were in Montana, Utah, and Virginia, with rates of 2.9, 2.7, and 1.5, respectively, per 1,000 population.

The highest fatality rates were in Arizona, New Jersey, and Maryland, with rates of 10.3, 4.3, and 2.3, respectively, per 100 cases. The lowest fatality rates were reported in Illinois, Wisconsin, and California, with rates of 0.05, 0.09, and 0.13, respectively, per 100 cases.

Among the larger cities the highest reported case rates were in Nashville, Tenn., Salt Lake City, Utah, and Milwaukee, Wis., with rates of 3.22, 2.98, and 2.76, respectively, per 1,000 population.

Of the cities of less than 100,000 population the highest rates were reported in Waco, Tex., New Albany and Anderson, Ind., with rates of 13.41, 12.60, and 12.28, respectively, per 1,000 population. The highest fatality rates (not including Yonkers, N. Y., which had one fatal case) were reported at El Paso, Tex., where there were 191 cases, with 49 deaths, giving a fatality rate of 25.6 per 100 cases.

During the latter part of the year 1914 and the first part of 1915 there was an outbreak of virulent smallpox at Chattanooga, Tenn. The infection was imported by one M. L., who arrived at Chattanooga from El Paso, Tex., on November 9, 1914, suffering with a severe type of smallpox, from which he died. Subsequent to his arrival two other cases of confluent smallpox developed in the same house. The total number of reported cases from the original one in November to January 15 was 56, with 16 deaths, a fatality rate of 28.6 per 100 cases. During December there occurred 38 cases, of which 13 ended fatally. From January 1 to 15 there were 15 cases, with 2 deaths. Most of the fatal cases were of the hemorrhagic type. With the exception of the cases of varioloid, all were of the hemorrhagic or confluent types.

The wife of the patient in the first case stated that her husband had worked in a construction camp outside of El Paso before coming to Chattanooga, that he fell ill during the progress of his journey,

and stopped over a few hours at Montgomery and also at Birmingham. At the latter place he was feeling extremely ill, and was also very ill on arriving at Chattanooga, where the eruption was noticed the following morning.

The virulence of the disease was shown in a case which was reported on the afternoon of January 15. The patient had been sick three days, with initial symptoms of a chill, severe headache, and backache. The attending physician had treated him for influenza. On the morning of January 15, the third day of the disease, ecchymoses and petechiæ began to appear, and shortly afterwards he had severe hematuria and died at noon. The body presented no evidence of macular or papular eruption. It was very frankly a case of purpura variolosa.

Virulent smallpox has been present at Laredo, Tex., for some months. From January 1 to March 13, 1915, 124 cases of smallpox were reported at Laredo, of which a considerable number were fatal.

Beginning in May, 1915, there was an outbreak of virulent smallpox at New Bedford, Mass. Between May 15 and July 3 there were 21 reported cases, with 9 deaths. The source of the infection could not be traced.

Cases reported, and case and fatality rates, in States in which the prevalence of smallpox is recorded, 1913 and 1914.

	Estimated population July 1, 1914.	1914			1913				
		Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhabitants.	Indicated fatality rate per 100 cases.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhabitants. ¹	Indicated fatality rate per 100 cases.
Alabama.....	2,269,945	.....	.....	.....	.....	926	6	0.414	0.65
Arizona.....	239,053	68	7	0.284	10.29	2,207	21	.....	.....
California.....	2,757,895	777	1	0.282	0.13	800	15	0.300	1.88
Connecticut.....	1,202,688	95	.....	0.079	.....	190	1	0.161	0.53
District of Columbia.....	1,353,378	150	.....	0.424	.....	140	.....	0.402	.....
Florida.....	848,111	.....	.....	.....	.....	1,166	4	1.413	0.34
Idaho.....	395,407	3,956	2	0.661	0.05	609	3	1.608	0.49
Illinois.....	5,986,781	4,036	7	1.452	0.17	2,505	3	0.424	0.12
Indiana.....	2,779,467	3,155	10	1.420	0.32	3,110	10	1.126	0.32
Iowa.....	2,221,755	1,616	7	0.905	0.43	2,131	5	0.959	0.24
Kansas.....	1,784,897	1,585	1	0.330	0.170	812	4	0.461	0.49
Louisiana.....	1,773,482	216	5	0.161	2.31	4132	2	0.099	1.52
Maryland ²	1,341,075	.....	.....	.....	.....	157	.....	0.044	0.15
Massachusetts.....	3,605,522	1,426	2	0.479	0.14	1,988	3	0.677	0.24
Michigan.....	2,976,030	1,847	6	0.834	0.32	2,866	7	1.314	.....
Minnesota.....	2,213,919	1,173	7	0.617	0.60	.....	.....	.....	.....
Mississippi.....	1,901,882	1,264	5	2.922	0.40	738	3	1.761	0.41
Montana.....	432,614	.....	.....	.....	.....	261	.....	2.755	.....
Nevada.....	98,726	23	1	0.008	4.35	63	.....	0.023	.....
New Jersey.....	2,815,663	791	3	0.080	0.38	828	1	0.085	0.12
New York.....	9,899,761	4,789	.....	0.953	.....	2,561	4	0.516	0.16
Ohio.....	5,026,898	.....	.....	.....	0.43	1,910	80	0.985	4.19
Oklahoma.....	2,026,534	.....	.....	.....	.....	1,014	3	1.340	0.30
Oregon.....	783,239	464	2	0.592	.....	.....	.....	0.433	.....
Philippine Islands.....	8,650,937	151	430	0.399	.....	681	.....	1.023	3.57
South Carolina.....	1,590,015	634	.....	0.299	0.81	4,658	63	0.423	0.25
South Dakota.....	1,661,883	1,228	1	0.299	0.18	2,443	6	0.614	0.75
Texas.....	4,257,854	.....	.....	.....	.....	1,334	1	0.372	.....
Utah.....	414,518	1,139	2	2.748	0.57	1,498	.....	1.203	0.12
Vermont.....	361,205	25	.....	0.069	0.40	1,620	2	0.848	0.10
Virginia.....	2,150,009	3,176	18	1.477	0.09	2,652	.....	0.784	.....
Washington.....	1,407,865	749	3	0.532	.....	128	.....	.....	.....
Wisconsin.....	2,446,716	3,302	3	1.350	.....	.....	.....	.....	.....
Wyoming.....	168,736	86	.....	0.510	.....	.....	.....	.....	.....

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.

² For six months only.

³ Exclusive of the city of Baltimore.

⁴ The health officer states that cases are known not to be completely reported.

VACCINATION STATUS OF REPORTED CASES.

A number of State departments of health endeavor to ascertain the vaccination histories of all persons contracting smallpox. The following gives a summary of the vaccination status of such persons in these States for the calendar year 1914, and the available information for 1912 and 1913:

State and year.	Cases reported.	Vaccination history of cases.					Remarks.	
		Deaths.	Number vaccinated within seven years preceding attack.	Number last vaccinated more than seven years preceding attack.	Number never successfully vaccinated.	Vaccination history not obtained or uncertain.		
1914.								
California.....	638	-----	17	49	350	222		
District of Columbia.....	27	-----	4	3	20	-----		
Maryland (exclusive of Baltimore).....	214	1	1	3	210	-----		
Massachusetts.....	24	2	6	4	12	2		
Michigan.....	1,244	1	7	41	998	198		
Minnesota.....	1,732	-----	22	105	1,186	419		
New York.....	730	-----	38	33	553	106		
Ohio.....	4,578	13	12	65	1,667	2,834		
Wisconsin.....	3,004	7	163	190	779	1,872		
Total.....	12,191	24	270	493	5,775	5,653		
1913.								
California.....	662	-----	24	36	419	183		10 months, March to December. Except May and July. Except July. Except June. Except February, March, April, and May. January only.
Maryland (exclusive of Baltimore).....	103	-----	-----	6	97	-----		
Massachusetts.....	152	-----	23	16	76	37		
Michigan.....	1,478	-----	15	55	1,114	294		
Minnesota.....	2,861	-----	47	201	2,255	358		
New York.....	737	-----	22	94	432	189		
Ohio.....	1,782	-----	10	21	763	988		
Vermont.....	34	-----	-----	1	9	24		
Wisconsin.....	2,054	-----	160	195	520	1,179		
1912.								
Massachusetts.....	37	-----	1	1	23	12	October, November, December. 7 months, June to December. November only. October, November, December.	
Minnesota.....	1,066	-----	25	76	775	190		
Montana.....	20	-----	-----	-----	4	16		
New York.....	372	-----	-----	29	204	139		

TRACHOMA.

During the year the localities in which the presence of trachoma has been ascertained to exist were as follows:

An examination of the pupils of the graded schools of Versailles, Woodford County, Ky., revealed 9 cases of trachoma among 294 pupils.

An examination of the inmates of the Kentucky Houses of Reform at Greendale, Ky., revealed 21 cases of trachoma among 423 inmates.

One hundred and fifty-eight cases of trachoma were reported during the month of January, 1915, as the result of a special investigation of the schools in and adjacent to the Pottawatomie Reservation, in Jackson County, Kans. The investigation included the city schools of Holton. The medical officer of the Indian Service on the Blackfoot Indian Reservation, Mont., reported that there were many cases of trachoma there.

TUBERCULOSIS.

The highest rates for tuberculosis were reported in Mississippi, New York, and New Jersey, and the lowest fatality rates in Mississippi, Maryland, and Indiana, so that it would appear probable that the most complete reports of cases of this disease are being obtained in these five States.

Of the cities of over 100,000 population the highest case rates were reported in Newark, N. J., Los Angeles, Cal., and Albany, N. Y., with rates of 5.44, 5.27, and 4.45, respectively, per 1,000 population. On the other hand, the greatest numbers of cases reported in proportion to the numbers of deaths registered were in Camden and Newark, N. J., and New Haven, Conn.

Of the cities of less than 100,000 population the highest case rates were reported in Elmira, N. Y., Warren, Ohio, and Lebanon, Pa., with rates of 10.65, 10.02, and 6.17, respectively, per 1,000 population.

Cases reported, and case and fatality rates, in States in which the prevalence of tuberculosis is recorded, 1913 and 1914.

	Estimated population July 1, 1914.	1914				1913			
		Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhabitants.	Number of cases reported for each death registered.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 inhabitants. ¹	Number of cases reported for each death registered.
Alabama.....	2,269,945	2,568	5,292	2.66	1.07	2,979	2,009	.....	.....
California.....	2,757,805	1,885	1,406	1.67	1.26	2,571	5,370	.....	.....
Connecticut.....	1,902,683	1,097	1,715	2.91	1.48	1,938	1,306	1.640	1.39
District of Columbia.....	353,378	1,057	371	1.78	1.88	1,176	803	3.379	1.46
Hawaii.....	208,063	3,922	1,796	1.41	2.18	568	374	2.96	1.52
Indiana.....	2,779,467	1,050	1,065	.605	1.01	.....	3,993	.....	3.23
Iowa.....	1,784,897	1,673	1,106	.943	1.51	2,721	223	.409	.....
Kansas.....	1,773,482	3,438	1,355	1.013	2.52	3,299	1,122	2.48	2.94
Maryland.....	1,541,075	2,566	2,679	.862	1.33	8,012	(*)	2.298	.....
Massachusetts.....	3,005,522	3,045	2,295	1.375	1.33	1,920	2,572	1.154	1.12
Michigan.....	2,976,030	7,897	2,479	4.152	3.18	2,516	2,236	.....	.....
Minnesota.....	2,213,919	236	399	.546	.....	124	378	.....	.....
Mississippi.....	1,901,882	8,407	4,330	3.007	1.95	8,054	52	1.499	2.73
Montana.....	98,726	* 31,073	16,438	3.139	1.89	31,071	4,109	2.929	1.96
Nevada.....	2,815,963	45,685	(*)	1.131	.....	791	13,657	3.199	2.27
New Jersey.....	9,899,761	2,026,534	622	.535	.....	622	622	.408	1.27
New York.....	5,026,898	783,239	419	.....	.....	791	588	.....	.....
Ohio.....	2,026,534	8,650,937	19,236	.901	.....	358	.....	.....	.....
Oklahoma.....	783,239	1,184,489	1,664	.856	.....	.....	.....	.....	.....
Oregon.....	8,650,937	1,014	934	1.355	.....	.....	.....	.....	.....
Philippine Islands.....	591,215	384	(*)	.242	.....	409	(*)	.260	.....
Porto Rico.....	1,590,015	661,583	57	.086	.....	234	5	.053	6.80
Rhode Island.....	591,215	414,518	148	.357	.....	238	164	.....	.....
South Carolina.....	661,583	361,205	297	.822	.....	.....	.....	.....	.....
South Dakota.....	414,518	2,150,009	4,421	2.056	1.06	4,597	(*)	2.159	.....
Texas.....	2,150,009	1,407,865	2,160	1.137	1.32	2,006	1,197	.....	.....
Vermont.....	1,407,865	1,765	2,319	.721	.....	1,621	1,802	.....	.....
Virginia.....	2,446,716	.....	.....	.....	.....	.....	.....	.....	.....
Washington.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wisconsin.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.

² The health officer states that cases are known not to be completely reported.

³ Exclusive of the city of Baltimore.

⁴ Deaths were not reported.

TYPHOID FEVER.

Typhoid fever, while one of the diseases most readily controlled and possible of absolute prevention, is one of the most common in the United States. It is a disease as regards which there has always been considerable trouble in getting cases reported. However, the States which seem to have been most successful in getting reports are Mississippi, Virginia, and Utah, the records of which give case rates of 3.24, 1.82, and 1.61, respectively, per 1,000 population. The lowest fatality rates—that is, the greatest proportion of reported cases as compared with registered deaths—were in the States of Utah, Mississippi, and Maryland, with rates of 9.7, 10.1, and 10.6 per 100 cases, respectively.

In the cities of over 100,000 population the highest case rates were in Nashville, Tenn., Birmingham, Ala., and Reading, Pa., with recorded rates of 2.99, 2.63, and 2.23, respectively, per 1,000 population. The lowest fatality rates were in New Bedford and Worcester, Mass., and Salt Lake City, Utah, with rates of 7.8, 8, and 9.1, respectively, per 100 cases.

In the cities of less than 100,000 population the highest case rates were reported in Logansport, Ind., Dunkirk, N. Y., and North Tonawanda, N. Y., with case rates of 9.27, 7.80, and 7.66, respectively, per 1,000 inhabitants. The lowest fatality rates were reported in Warren, Pa., Kearny, N. J., and Cambridge, Ohio, with rates of 1.5, 2.4, and 2.9, respectively, per 100 cases.

Cases reported, and case and fatality rates, in States in which the prevalence of typhoid fever is recorded, 1913 and 1914.

	1914				1913			
	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 in-habitants.	Indicated fatality rate per 100 cases.	Total cases reported.	Total deaths registered.	Indicated case rate per annum per 1,000 in-habitants. ¹	Indicated fatality rate per 100 cases.
Alabama.....	2,269,945				1,303	565	0.582	243.36
Arizona.....	239,053				1,484	435	1.13	29.31
California.....	2,757,805	376	0.656	220.77	1,484	435	.556	13.52
Connecticut.....	1,202,688	108	.610	14.71	954	127	.807	12.36
District of Columbia.....	353,378	45	.962	13.24	461	57	1.324	256.30
Hawaii.....	208,063	49	.956	224.62	215	63	1.120	253.00
Idaho.....	308,007				176		.465	14.74
Illinois.....	5,986,781	680	.660	215.93	4,926	726	.834	222.17
Indiana.....	2,731,467	568	.899	222.72	3,135	695	1.136	6.83
Iowa.....	1,783,897	339	.949	20.02	1,347	92	.764	10.25
Kansas.....	1,773,482	83	.295	15.83				
Louisiana.....	1,341,075	197	1.387	10.59	2,984	306	2.213	678
Massachusetts.....	3,665,322				2,398	(⁶)	.678	222.91
Michigan.....	2,976,030	378	.653	19.45	2,313	530	.788	17.41
Minnesota.....	2,213,919	217	.806	12.16	1,298	226	.595	15.49
Mississippi.....	1,784	624	3.249	10.10				9.73
Missouri.....	1,901,882	61	1.158	12.18	523	81	1.248	14.79
Montana.....	432,614				185	18	1.953	216.15
Nevada.....	98,726				6,200	1,001	.638	
New Jersey.....	2,815,663	223	.555	14.26				14.76
New York.....	9,899,761	867	.554	15.82	2,296	339	1.184	220.31
Ohio.....	5,026,898		.954		325	66	.429	
Oklahoma.....	2,026,534							
Oregon.....	783,239	60	.290	26.43				
Philippine Islands.....	8,650,937	251	.029	24.173				
Porto Rico.....	1,184,489	133	.323	14.32				
Rhode Island.....	591,215	58	.685					
South Carolina.....	1,317	(⁶)	.828		869	(⁶)	.553	
South Dakota.....	661,583	42	.215	29.58	613	14	.222	9.79
Texas.....	414,518	65	1.612	9.73	973	90	2.404	9.25
Vermont.....	361,205	44	1.612	16.00				
Virginia.....	2,150,009	484	1.825	12.33	5,968	(⁶)	2.803	16.51
Washington.....	6,733	149	1.825	20.33	733	121	.280	230.72
Wisconsin.....	2,446,716	134	.226	24.23	677	208	.441	234.72
Wyoming.....	168,736	49	.290	26.53	72	25		

¹ The computations of case rates for 1913 were made on the basis of estimated population July 1, 1913.² A fatality rate as high as this indicates that the cases have not been completely reported.³ For 6 months only.⁴ The health officer states that cases are known not to be completely reported.⁵ Exclusive of the city of Baltimore.⁶ Deaths were not reported.

TYPHUS FEVER.

Cases of typhus fever have been discovered among arriving immigrants and in those who had recently arrived. Cases have also been reported in various cities and localities of the United States in persons who were not recently arrived immigrants and, in some instances, had apparently not associated with recently arrived immigrants. While these cases appear to be sporadic, it seems to be probable that many other cases occurred but were not recognized. The disease as recognized in New York City, by Dr. Brill and others, is so comparatively mild that frequent failure in diagnosis is to be expected. Cases have been reported in New York City, Galveston, Tex., Alameda, Cal., and Baltimore, Md.

During the calendar year 1914, 8 cases of typhus fever with 1 death were reported in the State of New York, 1 fatal case in Rhode Island, 1 case in South Carolina, and 33 cases in the Philippine Islands.

Arriving immigrants.—On May 1, 1915, a case of typhus fever was removed at quarantine from the steamship *Christoforos*, from Marseille via Oran. The case was in a member of the crew. On May 4 a case was removed in the person of a Servian, 20 years of age, from the steamship *Carpathia*, from Piræus.

New York City.—During the first week of November, 1914, a case of typhus fever was reported in New York City. Another case was notified during the week ended June 2, 1915.

Texas—Galveston.—During the week ended November 23, 1914, a case of typhus fever was reported in Galveston in the person of a Greek, male, age 34 years, a candy maker, who had lived in Galveston for the preceding four months. Source of infection was unknown. There were probably other cases unrecognized in the city. Another case was reported during the week ended November 28.

Maryland—Baltimore.—On June 28, 1915, a case of typhus fever was reported in Baltimore. It was impossible to trace the source of infection. The patient was the keeper of a small store. The disease was of the mild type which has been observed in many of the larger cities of the United States.

WORLD PREVALENCE OF CHOLERA, PLAGUE, YELLOW FEVER, AND TYPHUS FEVER.

CHOLERA.

As usual, the chief prevalence of cholera was in Asia. The disease, however, made its appearance in certain countries of Europe. Several thousand cases were reported in various parts of Austria-Hungary. Cases were also reported in Germany, Greece, Russia, and Turkey.

In Asia, the chief haunts of the disease were, as usual, Indo-China, Ceylon, Dutch East Indies, Siam, Straits Settlements, and Turkey in Asia, with a few cases reported in Japan and Persia.

PHILIPPINE ISLANDS.

At Manila 482 cases were reported between July 4 and October 24, 1914, and in the Provinces 1,131 cases between July 2 and October 5, 1914. The disease occurred in many localities in numerous Provinces.

PLAGUE.

Plague has continued to be present to some extent in most of the maritime countries. There have been no striking or unusual outbreaks. It has persisted most frequently in seaports. In numerous instances the infection has been found in rats, but has not affected man, so far as known.

SOUTH AMERICA.

In South America the disease has been reported in Brazil at Bahia, Pernambuco, and Rio de Janeiro; in Ecuador at Duran, Guayaquil, Milagro, and Sanborondon. The greatest prevalence of the disease was reported at Guayaquil, where there were 366 cases reported between November 1, 1913, and March 31, 1915. In Peru the disease was reported in the Provinces of Ancachs, Arequipa, Cajamarca, Callao, La Libertad, Lambayeque, Lima, and Piura. The disease was present in many localities, although the number of cases reported was not great in any one place.

CUBA.

Between March 5 and September 17 there were 43 reported cases of plague in Cuba. Twelve of these cases were reported at Santiago, and 4 at El Aceite. Between February 9 and June 14, 1915, there were 17 cases reported at Habana. Plague infection has been found among the rats in Habana. On April 9, 1915, two cases were reported at Pinar del Rio, and May 13 one case at Guanabacoa.

ASIA.

In Ceylon 241 cases of plague were reported at Colombo between May 19, 1914, and April 24, 1915. The disease was present in various parts of China during the year. Among the more important cities at which it was reported were Amoy, Canton, Chinchew, Fatshan, Hongkong, Pakhoi, and Shanghai.

The disease continued to prevail throughout India, where there were 270,242 reported cases between January 4 and October 17, 1914. In most of the provinces the disease has continued without intermission. Among the principal cities harboring the disease were Bassein, Bombay, Calcutta, and Rangoon.

In Indo-China the disease has been present in several provinces and numerous localities.

In Japan the disease was reported at Hodogaya, on the island of Taiwan, at Tokyo, and at Yakohama, as well as in other localities.

The disease was also reported in various places in Persia, Siam, and the Straits Settlements. In Turkey in Asia the disease was reported at Adalia, Bagdad, Basra, Beirut, Jaffa, Mitylene, Samos, and Smyrna.

In the Dutch East Indies a considerable prevalence of the disease was reported in the province of Kediri, Madioen, Pasoeroean, and Surabaya.

EUROPE.

In Great Britain nine cases of plague were reported at Liverpool between August 8 and 12, 1914. The disease was reported in various localities in Greece, chiefly at Chios, Piræus, and Saloniki. In Italy 17 cases of plague were officially reported during the period beginning September 1, 1914. Eight cases were reported in Portugal at Lisbon, October 8, 1914. In Russia plague was reported in the Astrakhan government in various localities, and 9 cases at Moscow between December 6, 1914, and February 13, 1915.

AFRICA.

Plague was reported in British East Africa at Mombasa during June and July, 1914. In Egypt the disease was reported at Alexandria and at Port Said, and also at various localities throughout the provinces. Fourteen cases were reported in German East Africa. Cases were reported in Derna and Marsa-Susa in Libya. Twelve cases were reported at Dakar in Senegal.

In the Union of South Africa pneumonic plague was reported at Queenstown and Tarka between September 24 and October 5, 1914. Between February 5 and April 10, 1915, the disease was reported present in Cape Province in the districts of Cradock, Maraisburg, Molteno, and Queenstown. Between July 1 and October 31, 1914, 30 cases of plague were reported at Zanzibar.

MAURITIUS.

Plague was reported on the island of Mauritius between April, 1914, and April 5, 1915.

YELLOW FEVER.

As usual, the principal localities in which the occurrence of yellow fever was reported were in South America. In Brazil 24 cases were reported at Bahia between May 10, 1914, and February 20, 1915, 2 cases at Rio de Janeiro, and 1 at Pernambuco. In Ecuador 16 cases were reported at Guayaquil between May 1, 1914, and April 30, 1915. In French Guiana 15 cases were reported at St. Jean du Maroni in September and October, 1914. In Venezuela 1 case was reported in June and 2 cases in December, 1914, 1 case at La Guayra in August, and 1 at Maracaibo in June, 1914.

In Mexico the disease was reported in Yucatan in Merida and Progreso.

A case of yellow fever was reported at Curacao December 9, 1914.

TYPHUS FEVER.

Typhus fever has continued to be reported in foreign countries, and during the year it appeared in the reports of European countries much more frequently than usual.

EUROPE.

Austria-Hungary.—In Austria-Hungary from August to December, 1914, there were 279 cases of typhus fever reported. From

January 1 to April 24, 1915, there were 5,310 cases reported. The disease has continued since that time, but apparently in a diminishing extent. Cases were reported at Budapest, Fiume, and Vienna, also in localities in Bosnia-Herzegovina and Croatia-Slavonia.

Germany.—In Germany 240 cases of typhus fever were reported between February 14 and May 8, 1915. The cases were principally among the German soldiers and prisoners of war. Cases were reported at Frankfort on the Main, Königsberg, and Lubeck.

Great Britain and Ireland.—In Dublin cases of typhus fever were reported in February, March, and June, 1915; in Dundee during May; in Glasgow in March and May.

Greece.—In Greece typhus fever was reported present at Athens during April and May, 1915, and at Saloniki from December, 1914, to May, 1915.

Italy.—Typhus fever was reported present in Florence from November 1, 1914, to the end of April, 1915. In Venice it was reported present during January, 1915. In Turin one case was reported during May, 1915.

Netherlands.—A case of typhus fever was reported at Rotterdam in October, 1914, and another case at Flushing in May, 1915.

Russia.—During the period December, 1914, to April, 1915, typhus fever was reported present in Russia at Moscow, Odessa, and Petrograd. During the latter part of 1914 the disease was present in Warsaw. A case was reported at Batum in August, 1914. At Riga there were 15 reported cases between June 1 and October 17, 1914. The greatest prevalence of the disease in Russia was reported at Moscow.

Serbia.—There has been some typhus fever in Serbia and the Balkan region for a number of years. In January, 1915, the disease became epidemic in Serbia, and for the next few weeks the number of cases increased rapidly. At one time there were estimated to be at least 500 deaths daily from the disease. It was unusually virulent and attacked a great many physicians and nurses in attendance upon the sick. To such an extent was this so and so great were the fatalities that it was difficult at times to maintain an adequate medical and nursing service. By May the disease seemed to be diminishing, both in virulence and in number of cases, and by June it seemed to be well under control.

Spain.—In Spain typhus fever was reported at Madrid and Tarragon, there being five reported deaths at Madrid during March and three during April, 1915.

Switzerland.—One case of typhus fever was reported at St. Gallen in May and one in April; and two cases were reported in June at Zurich.

ASIA.

Siberia.—Typhus fever was reported present at Vladivostok from December, 1914, to March, 1915.

China.—Cases of typhus fever were reported in China at Antung, Hankow, Harbin, Manchuria Station, and Tientsin.

Japan.—In Japan typhus fever was present at Hakodate, Tokyo, and Yokohama.

Turkey in Asia.—Typhus fever was reported from many points in Turkey in Asia. The disease seemed to be pretty well distributed throughout the country. The reported cases were principally at military centers, camps, and hospitals.

MISCELLANEOUS.

Egypt.—A considerable number of cases of typhus fever were reported during the year at Alexandria, Cairo, and Port Said. At Alexandria there were 232 reported cases from February 12 to May 20, 1915, and at Cairo 170 deaths between January 21 and April 29.

Guatemala.—Typhus fever was reported present at Guatemala City during March, 1915.

Mexico.—Typhus fever was present in Mexico, as it has been for a number of years, especially at the higher altitudes.

Islands.—Typhus fever was reported present in the Azores at Terceira in February, 1915, and in Bermuda at Warwick Camp. There was a case reported in the Canary Islands, and a death was reported at Santa Cruz de Teneriffe in May, 1915. The disease was reported present in the Dutch East Indies at Batavia and in the surrounding country.

MARINE HOSPITALS AND RELIEF.

RELIEF STATIONS.

During the fiscal year ended June 30, 1915, the service operated 23 marine hospitals, all of which are owned by the Government, and maintained 121 other relief stations where hospital and dispensary relief was furnished patients. In order to furnish medical relief to seamen in districts not heretofore provided for, relief stations were established during the year at Port Angeles, Wash., and Newport, Oreg. Owing to the limited amount of treatment furnished sick and disabled seamen, the relief stations at Crisfield, Md., and Beaufort, N. C., were reduced during the year from stations of the third class to stations of the fourth class and placed in charge of the local customs officers.

In lieu of the then existing Revenue-Cutter Service and Life-Saving Service, to be composed of those two organizations with the incumbent officers and men, the United States Coast Guard was established by act of Congress approved January 28, 1915. In accordance with the provisions of this act, officers and enlisted men of the Coast Guard are entitled to the same medical relief as is provided by the regulations of the service for officers and enlisted men of the former Revenue-Cutter Service. It is apparent that this provision, as affecting surfmen in particular, will greatly increase the expenditure for the maintenance of the service.

Section 3 of the above-mentioned act of Congress provides in part as follows:

That all existing laws affecting rank, pay, and allowances in the present Life-Saving Service and the present Revenue-Cutter Service shall apply to the corresponding positions in the Coast Guard and the officers and men transferred thereto and their successors. This shall include all laws and regulations which now give to the enlisted men of the existing Revenue-Cutter Service increased pay of \$1 per month for each year's service, allowances for uniforms, and all other allowances or gratuities due to enlisted men, which are hereby made applicable to the enlisted men of the Coast Guard who were formerly surfmen in the Life-Saving Service. The provisions of sections 3, 4, 5, 7, 8, and 9 of the act of April 12, 1902, in so far as they provide for the retirement of officers of the Revenue-Cutter Service, are hereby extended to include commissioned officers, warrant officers, and enlisted men of the Coast Guard.

In view of the provision made for the retirement of officers and enlisted men of the Coast Guard, said service requires that all its officers and men be subjected to rigid physical examinations for enlistment and reenlistment. As these physical examinations are made by medical officers of the service, the effect of said provision is, so far as it concerns the service, to require medical officers in charge of relief stations to make a far greater number of, and much more complete, physical examinations of such applicants than formerly.

In accordance with provisions contained in paragraph 459, regulations of the service, officers and crews of the several vessels belong-

ing to the Lighthouse Establishment, including lightships, are entitled to the benefits of the service. It will be observed, however, that there is no provision made in the regulations for the care and treatment of keepers of lighthouses and their assistants. In accordance with department approval of March 16, 1915, provision is made whereby officers in charge of relief stations shall furnish, upon receipt of written requests signed by the proper officials, necessary medical treatment to officers and other employees of the Lighthouse Service who are not entitled to free treatment under the regulations, the service to be reimbursed for such treatment by the Department of Commerce, at the same rates as are now, or may be hereafter, charged in case of officers and enlisted men of the United States Army and Navy.

With the approval of the Commissioner of Internal Revenue the following instructions relative to the purchase of narcotic drugs for use on board certain classes of vessels were issued by the Secretary of the Treasury in the form of a circular, dated June 21, 1915:

Hereafter opium or coca leaves, their salts, derivatives, or preparations, coming within the purview of act of Congress approved December 17, 1914, may be purchased for stocking medicine chests and dispensaries maintained on board both ocean-bound vessels and vessels engaged in trade between ports of the United States (provided there is no physician registered under the provisions of said act employed on board the same), and vessels belonging to the various departments of the Government, upon the approval of commissioned medical officers and acting assistant surgeons of the United States Public Health Service. In approving such orders, said medical officers shall, in each case, consider the advisability of permitting the medical supplies mentioned, or any part thereof, to be purchased for use on board the vessel.

If a vessel engaged in trade either between the United States and a foreign country or between ports of the United States employs on board a physician registered under the provisions of the above-mentioned act of Congress, opium or coca leaves, their salts, derivatives, or preparations required in supplying the medicine chest or dispensary maintained on the vessel may be purchased only upon the order of said physician.

In order to make effective the above instruction issued by the Secretary, an order blank has been prepared as a service form, with the approval of the Commissioner of Internal Revenue and the Secretary of the Treasury. These blanks will be furnished, upon request, to masters of vessels.

After an order for narcotic drugs has been prepared by the master of a vessel he shall present it to an officer of the service for certification, in accordance with the provisions mentioned above. Each original order for such drugs shall be filed with the permit or license number of the person or firm filling the order, and the duplicate order shall be retained by the master of the vessel. Attention is called to the fact that such orders for narcotic drugs are to be signed by medical officers of the service only in case there is no physician employed on board the vessel who is registered under the provisions of said act of Congress.

RELIEF TO SEAMEN AND OTHERS.

During the year 55,781 patients were treated at the various marine hospitals and relief stations of the service. Of this number, 15,439 were treated in hospitals a total of 446,227 days, and 40,343 were treated at dispensaries a total of 68,466 times. During the same

period 484 seamen engaged on foreign vessels received hospital treatment a total of 6,623 days.

In accordance with the act of Congress approved June 24, 1914, the Coast Guard cutter *Androscoggin* was fitted up as a hospital ship for the purpose of extending medical and surgical aid to crews of American vessels engaged in the deep-sea fisheries on the coast of Maine and around Newfoundland. A medical officer of the service was detailed for duty on board this vessel, together with a trained male nurse, to furnish professional services to patients. The vessel is provided with a sick bay of six bunks, a well-equipped dispensary, an operating room, and an isolation room with two bunks for the treatment of patients suffering with contagious diseases.

The above-named vessel began its service as a hospital ship about the 1st of January and from that time to June 30, 1915, 6 patients were treated in the sick bay a total of 26 days, and 345 patients received office treatment, a total of 584 times.

During the year medical officers of the service were attached to various vessels of the Coast Guard and during the cruises of these vessels they furnished a great deal of medical relief to natives of Alaska and the surrounding islands, in addition to medical treatment furnished officers and crews of the vessels.

PHYSICAL EXAMINATIONS.

The medical officers of the service made 7,357 physical examinations during the year, as noted under the special headings given below. These examinations were made of applicants for original or renewal of license as master, mate, or pilot; applicants desiring to enter or already engaged in the various departments of the Government; applicants desiring to take civil-service examinations; examinations of American seamen, foreign seamen, and persons desiring to enter the Government service in the Philippine Islands and the Panama Canal Zone.

Steamboat-Inspection Service.—Three thousand six hundred and eighteen examinations were made for license as master, mate, or pilot, of which number 80 were rejected.

Merchant seamen of the United States.—Physical examinations were made of 1,096 American seamen, of which number 27 were rejected.

United States Coast Guard.—Two thousand two hundred and twenty-eight applicants for enlistment and reenlistment were examined, of which number 157 were rejected.

Four hundred and seventy-six disability certificates referred to the bureau by the Coast Guard were passed upon. These called for an expression of opinion on the medical evidence submitted in claims for benefits under act of Congress approved May 4, 1882; upon the physical fitness of keepers and surfmen for enlistment, promotion, and retention; and upon evidence of death submitted by widows or orphans in their claims for benefits.

The services of 21 acting assistant surgeons were continued during the year for the physical examinations of keepers and surfmen at points not easily accessible to regular officers at stations of the service.

Coast and Geodetic Survey.—Ninety-three employees and applicants for appointment were examined, of which number 8 were rejected.

Lighthouse Service.—Thirty-six applicants for enlistment were examined, of which number 3 were rejected.

Foreign seamen.—Five foreign seamen were examined as to physical fitness for duty, of which number 1 was rejected.

Immigration Service.—Sixty-seven persons connected with the Immigration Service were physically examined, of which number 2 were rejected.

Civil Service Commission.—One hundred and ninety-one applicants for appointment to the Government service were examined, of which number 10 were rejected.

Panama Canal Zone.—Three employees and applicants for appointment in the Panama Canal Zone were examined, of whom none was rejected.

Philippine Islands.—Physical examinations were made of 12 applicants to serve in the islands, of which number none was rejected.

Engineer Corps, United States Army.—Examinations were made of five applicants, of whom none was rejected.

Post-office employees.—Examination was made of one post-office employee to determine his fitness for duty.

United States Navy.—Examination was made of two enlisted men of the Navy, of whom none was rejected.

PURVEYING DEPOT.

The following table shows the transactions of the purveying depot during the year:

Supplies purchased.

Drugs and chemicals	\$18,055.32
Surgical instruments and appliances	13,275.91
Beds, bedding, etc	8,201.93
Dry goods	7,323.00
Pharmaceutical implements, etc	1,219.94
Rubber goods	1,060.89
Books and journals	822.14
Alcohols, wines, etc	692.48
Flags	1,103.26
Packing boxes and sawdust	458.80
Bacteriological supplies, etc	1,331.99
Electric lamps	1,014.27
Kitchen utensils and tableware	2,452.54
Miscellaneous	4,800.87
Furniture	3,066.14
Total	64,879.48

CREDIT.

By bills paid direct from funds:

Bureau	\$174.27
Care of seamen	810.37
Epidemic	124.06
Quarantine	4,698.92
Furniture	2,730.20
Special studies of pellagra	477.73
Field investigations	141.96
Maintenance	3,455.12
National quarantine and sanitation	655.33
United States Coast Guard	16.50
	13,284.46

Total 51,595.02

By amounts reimbursed from other appropriations for supplies issued from stock:

Quarantine Service	3,316.37
Special studies of pellagra	1,025.33
Epidemic fund	1,309.48
National quarantine and sanitation	684.98
Field investigations	105.99
Coast Guard	101.80
Interstate quarantine	46.34
Prevention interstate spread of disease	2.70
Transportation company, for goods lost in transit	4.00
	6,596.99

Net expenditures chargeable to appropriation for purveying depot (in amount \$45,000) 44,998.03

Salaries	\$6, 669. 16	
Operating expenses	66. 77	
		\$6, 735. 93
Total net expenditures		51, 733. 96
Number of requisitions filled		858
Number of packages shipped from depot		2, 501
Total weight of supplies shipped from depot	pounds..	185, 334
Number of orders for supplies shipped direct by contractors		343
Total weight of supplies shipped direct to stations by contractors	pounds..	255, 590

TUBERCULOSIS SANATORIUM, FORT STANTON, N. MEX.

A REPORT FOR THE YEAR ENDED JUNE 30, 1915, OF THE SANATORIUM MAINTAINED BY THE PUBLIC HEALTH SERVICE FOR THE TREATMENT OF TUBERCULOSIS PATIENTS.

[By F. C. Smith, passed assistant surgeon.]

In accordance with the custom since 1899, the tuberculosis beneficiaries of the Public Health Service have been transferred from the various marine hospitals to the Fort Stanton Sanatorium whenever such cases appeared suitable for treatment at that place. Increasing discrimination is being shown before transfer is effected. It is the custom to delay transfer of a patient until rest in bed at the home station brings the temperature to nearly normal, for it has been found that bedridden cases do very little better at Fort Stanton than elsewhere. The facilities for nursing terminal cases are no better at Fort Stanton than at marine hospitals. The patients receiving the greatest amount of benefit from the climate are young or middle-aged men without much dyspnea, disease not acutely progressing, and abdominal viscera undamaged by terminal changes. It seems that a patient grows worse rapidly or improves rapidly, as the case may be, in this climate. The station continues to receive occasional cases unsuited for transfer, as is evidenced by five deaths within one month after arrival, and four between one and three months after arrival. Cases are also occasionally sent which would be considered suitable for discharge if the result had been attained after sanatorium treatment. In other words, the discrimination between patients suitable for transfer and those in which transfer is useless and those in which it is unnecessary is not always accurately made.

General information.

Patients present July 1, 1914	186
Patients admitted during the year	143
Total treated during year	329
Patients discharged during the year	79
Deaths during the year	48
Patients under treatment June 30, 1915	202
Bodies interred in sanatorium cemetery	46
Minimum number of patients during the year (July 5 and 6, 1914, included)	185
Maximum number of patients during the year (Feb. 1 to 5, 1915, included)	233
Total days treatment furnished patients	79, 251
Officers and attendants	87
Patients who left against advice	30
Patients who deserted	4

Patients readmitted.....	11
Patients retransferred.....	9
Total number readmitted.....	20
Patients discharged for causes affecting discipline.....	3
Patients transferred to other stations (1 asthma).....	1
Physical examinations made during year.....	1, 346
Average duration of stay of patients discharged, 1 year 11 days.	
Minimum stay, 7 days.	
Maximum stay, 5 years 7 months 24 days.	

Patients discharged during the year, with stage of disease and result of treatment.

	Appar- ently cured.	Arrested.	Im- proved.	Not im- proved.	Died.	Total.
Incipient.....	2	1	1	1		5
Moderately advanced.....		9	7	4	2	22
Far advanced.....		12	23	18	46	99
Nontuberculous.....			1			1
Total.....	2	22	32	23	48	127

Period of detention of the 48 who died included in the above summary.

Over 2 years.....	10
Between 1 and 2 years.....	13
Between 6 and 12 months.....	9
Between 3 and 6 months.....	7
Between 1 and 3 months.....	4
Under 1 month.....	5
Total.....	48

Prognosis on arrival.

Favorable.....	20
Favorable for arrest.....	37
Favorable for prolongation of life by living under proper conditions.....	33
Unfavorable.....	30
Doubtful.....	1
Grave.....	5
Nontuberculous.....	1
Total.....	127

CAUSE OF DEATH.

Forty-eight patients died during the year and 40 autopsies were held. Pulmonary hemorrhage was, as it has always been, a frequent cause of death. Reports have been made from time to time concerning this condition. The fatalities occurring from hemorrhage constituted about 10 per cent of the total number of deaths. The causes of death were as follows:

Tuberculosis of lungs, uncomplicated except by the usual terminal degenerative changes of viscera.....	32
Tuberculosis of lungs and pulmonary hemorrhage: ¹	
Sudden death.....	6
Exhaustion following.....	1
Broncho-pneumonia.....	1
Dilatation of heart.....	2
	10

¹ Ninety-one deaths have occurred at this station from pulmonary hemorrhage since it was opened in 1899.

Tuberculosis of lungs, intestines, and pyonephritis.....	1
Tuberculosis of lungs and hepatic cirrhosis.....	1
Tuberculosis of lungs, parenchymatous nephritis, and valvular disease of heart.....	1
Tuberculosis of lungs and tubercular peritonitis.....	1
Tuberculosis of lungs and chronic nephritis.....	1
Tuberculosis of lungs and mania.....	1
Total	48

Two deaths occurred among attendants during the year. One was caused by a fracture of the base of the skull in a range rider who was injured by falling from his horse. The other death was from pulmonary tuberculosis.

TREATMENT.

The use of Von Ruck's watery extract and of a proprietary vaccine have been discontinued during the year, the results being unsatisfactory. Treatment by induced-pneumo-thorax has been continued. From 418 patients 39 were selected as suitable cases, and of these 23 were treated; 659 treatments with nitrogen gas were given, 12 patients remain under treatment; 45 patients have received injections of chaulmoogra oil, 9 remaining under treatment. Pyorrhea alveolaris is treated specifically and by instrumentation.

The number of bedfast cases during the year averaged 55, or about 25 per cent of the total enrollment. This has overtaxed the capacity of the infirmary, the station being designed primarily for the treatment of ambulatory cases. As in previous years, the regulation of rest and exercise constituted the most important part of the treatment. Preference is given on the station pay roll to all approaching fitness for discharge, work being considered the therapeutic test of arrestment. Fifty-one patients were so employed for 30 days or more during the year, in addition to which 62 not suitable for full-time employment earned money by engaging in private enterprise under medical supervision at the station.

Graduated exercise and patient's earnings.

Total number of patients in work squads.....	96
Maximum number in work squads at one time.....	28
Number of patients declining work on exercise squads and assigned walking in lieu thereof ¹	5

Principal items of industry accomplished by work squads.

	Hours.
Passing wood to power saw.....	979
Hauling stove wood with horse and wagon.....	771
Garden work.....	69
Carrying trays in hospital.....	300
Cleaning hospital wards and in other buildings.....	868
Policing grounds.....	295
Assisting in laboratory and in property room.....	834
Preparing vegetables, painting, sewing canvas, etc.....	573
Walking.....	755
Total	5,444

¹ Such patients are not eligible for remunerative positions.

The approximate aggregate earnings of patients privately employed was \$4,360. Patients employed by the Government as attendants earned \$8,474.67; ex-patients, \$3,020.67. The total earnings of patients and ex-patients employed privately and by the Government were \$16,123.34.

LABORATORY.

The laboratory work consisted largely of routine clinical tests, as follows:

Number of sputum examinations.....	1, 139
Number of urine examinations.....	636
Number of examinations for ameba buccalis.....	416
Number of blood coagulation tests.....	504
Number of tests of dairy milk for butter fat.....	110

LIBRARY.

The library now contains 3,358 bound volumes; 74 magazines, periodicals, and daily papers are regularly received without expense to the Government. The average monthly issue of books and periodicals to patients and attendants was 1,430. One hundred Bibles and 290 other bound volumes were presented to the library during the year.

AMUSEMENTS.

The weekly moving-picture show of four films has been continued throughout the year free to patients and supported by private enterprise. The average attendance was 150. An electric piano has been added to the equipment of the amusement association. Nine games of baseball with visiting teams were played on the sanatorium grounds.

Statement of receipts and expenditures of the Marine-Hospital Amusement Association for the fiscal year 1914-15.

RECEIPTS.		DISBURSEMENTS.	
Balance brought forward.....	\$193. 16	Film rental.....	\$390. 00
Donations.....	701. 00	Express.....	116. 81
Miscellaneous.....	8. 36	Postage.....	5. 00
Sales.....	106. 13	Labor.....	9. 60
Base ball.....	468. 65	Miscellaneous.....	25. 48
Piano.....	86. 46	Telegrams.....	9. 48
		Base ball.....	535. 08
		Piano.....	375. 98
		Christmas entertainment.....	28. 00
		Balance carried forward.....	68. 33
	1, 563. 76		1, 563. 76

WATER SUPPLY.

Litigation is still pending concerning the Government's rights to water, both for that pumped for domestic purposes and that taken from the river for irrigation. Hydrographic surveys to collect necessary data have been continued throughout the greater part of the year.

An engineer from the Forest Service investigated the feasibility of a hydroelectric power plant on the Rio Ruidoso and a special

report was made by him thereon. It was found that power produced in that way would be more expensive than with the steam plant now in use.

COST OF MAINTENANCE.

Expenditures for the year amounted to \$132,803.89. The cost of each day's treatment per patient was \$1.6757. The cost of the daily ration was \$0.6554, which includes milk, beef, and other supplies produced at the station.

Items of expenditures.

Item.	Per annum.	Per patient per day.
Salaries:		
Medical officers and pharmacists.....	\$9,582.50	\$0.1209
Office force.....	5,750.84	.0726
Mechanical plant.....	2,820.00	.0356
Mechanics.....	3,005.00	.0379
Nurses and orderlies.....	3,578.00	.0451
Cooks and waiters.....	6,062.51	.0765
Laundry.....	1,320.00	.0167
Dairy.....	2,026.23	.0256
Poultry yard.....	367.50	.0046
Range.....	1,265.00	.0159
Farm.....	5,015.67	.0633
General.....	2,315.00	.0292
Total.....	43,108.25	.5439
Materials and supplies:		
Subsistence supplies.....	34,867.25	.4400
Mechanical plant (including coal).....	12,470.99	.1574
Miscellaneous supplies (buckets, brooms, etc.).....	1,915.00	.0242
Laundry supplies ¹	474.19	.0060
Freight and transportation.....	1,446.36	.0183
Table and kitchen ware.....	472.85	.0060
Wood.....	5,154.13	.0650
Building materials (maintenance).....	468.84	.0059
Dispensary.....	381.74	.0048
Telephone system (including new material for rebuilding long-distance line).....	1,125.62	.0142
Carpenters and plumbers' tools.....	149.46	.0019
Furniture.....	166.50	.0021
Farm supplies.....	2,584.72	.0326
Range supplies.....	2,030.90	.0256
Dairy supplies.....	915.19	.0115
Forage (for farm, dairy, and range).....	13,269.04	.1674
Repairs and preservation of public buildings.....	5,994.86	.0757
Mechanical equipment for public buildings.....	2,642.02	.0333
Supplies from purveying depot (incomplete).....	3,165.98	.0399
Total.....	89,695.64	1.1318
Salaries.....	43,108.25	.5439
Total expenditures.....	132,803.89	1.6757
Refund from reimbursement from officers and attendants for subsistence supplies.....	\$1,574.20	
Realized from sale of beef hides.....	1,144.13	
Realized from sale of miscellaneous condemned material.....	15.00	
	2,733.33	.0345
Net expenditures.....	130,070.56	1.6412

¹ Soft soap (4,775 gallons) was made from waste grease during the year.

FARM AND HERD.

The dairy has been enlarged and remodeled and is now thoroughly modern and sanitary. An efficient system of accounting has been introduced, and a loss in operation is found to result from the garden and poultry yard. The largest item of profit is shown by the herd. All beef and milk needed were produced at the station.

Statement of farm account.

CREDIT.

Beef (range), 104,978 pounds, at 15 cents per pound-----	\$15,746.70
Pork, 8,134 pounds, at 14 cents per pound-----	1,138.76
Chickens, 6 $\frac{1}{2}$ dozen, at \$4.50 per dozen-----	29.25
Eggs, 874 $\frac{1}{2}$ dozen, at 26 cents per dozen-----	227.37
Milk, 38,667 $\frac{1}{2}$ gallons, at 35 cents per gallon-----	13,533.54
Beef (veal, dairy), 3,981 pounds, at 15 cents per pound-----	579.15
Hides sold (dairy), 185 pounds, at 27 $\frac{3}{4}$ cents per pound-----	51.34
Hides sold (range), 3,928 pounds, at 27 $\frac{3}{4}$ cents per pound-----	1,092.80
Onions, 1,832 pounds, at 7 cents per pound-----	128.24
Apples, 27,952 pounds, at \$1.49 per hundredweight-----	416.48
Beets, 2,269 pounds, at 6 cents per pound-----	136.14
Cabbage, 4,343 pounds, at 4 cents per pound-----	173.72
Other vegetables-----	346.49
Hay, 266,405 tons, at \$16 per ton-----	4,262.48
Silage, 172 tons, at \$7.98 per ton-----	1,373.04
Salaries and rations for labor performed by farm and sanatorium force for sanatorium-----	2,755.72
Total -----	<u><u>41,991.22</u></u>

DEBIT.

Salaries and rations, including expert farmer, farm hands, dairymen, range riders, and sanatorium force-----	18,901.57
Repair material, farm machinery and wagons, dairy equipment, and range material-----	2,956.10
Forage purchased-----	13,269.04
1 Holstein-Friesian bull, for dairy-----	222.00
8 Hereford bulls, for range-----	1,600.00
Expert farmer's expenses to inspect bulls-----	96.47
Pasturage for range cattle at Mescalero agency for months of July, August, and September, 1914-----	250.00
Profit -----	4,696.04
Total -----	<u><u>41,991.22</u></u>

PERSONNEL.

COMMISSIONED MEDICAL OFFICERS.

At the commencement of the fiscal year, July 1, 1914, the commissioned corps consisted of the Surgeon General, 10 senior surgeons, 66 surgeons, 43 passed assistant surgeons, and 47 assistant surgeons.

The changes during the fiscal year were as follows: One senior surgeon was promoted to Assistant Surgeon General; 1 surgeon and 1 passed assistant surgeon were promoted to the grade of senior surgeon under act of Congress approved March 4, 1915; and 1 surgeon was promoted to grade of senior surgeon to fill vacancy. Seven passed assistant surgeons were promoted to the grade of surgeon, 6 assistant surgeons to the grade of passed assistant surgeon, and 23 candidates who passed the examination required by the laws and regulations of the service were commissioned assistant surgeons. On account of physical disability 2 surgeons and 1 passed assistant surgeon continued on waiting orders and 1 surgeon and 1 passed assistant surgeon were placed on waiting orders.

At the close of the fiscal year the commissioned Medical Corps consisted of the Surgeon General, 1 Assistant Surgeon General at large, 12 senior surgeons, 70 surgeons, 39 passed assistant surgeons, and 63 assistant surgeons. One senior surgeon and 5 surgeons were upon detail in the bureau as Assistant Surgeons General, in accordance with the act approved July 1, 1902.

ASSIGNMENTS.

Among other assignments of commissioned medical officers during the fiscal year were the following: Twenty-eight were assigned to exclusive immigration duty, their services being supplemented by employment of acting assistant surgeons; 6 to the quarantine service of the Philippine Islands; 11 to vessels of the United States Coast Guard; 23 to the quarantine stations in the continental United States, Porto Rico, and the Hawaiian Islands; 4 to duty in foreign countries to prevent the introduction of epidemic diseases into the United States.

SPECIAL DETAILS.

One commissioned medical officer continued on detail duty under the governor of the Panama Canal. Surg. John D. Long was detailed as chief quarantine officer of the Philippine Islands and appointed director of health of the islands, succeeding Surg. V. G. Heiser, who was relieved at his own request and granted leave of absence.

FIELD INVESTIGATIONS OF PUBLIC HEALTH.

In accordance with the act of Congress approved August 14, 1912, authorizing the service to study and investigate the diseases of man and conditions influencing the propagation and spread thereof—in

cluding sanitation and sewage and the pollution, either directly or indirectly, of the navigable streams and lakes of the United States—the following officers and corps of special assistants were detailed to make these special investigations:

Rural sanitation (headquarters, Hygienic Laboratory, Washington, D. C.): Surg. L. L. Lumsden, in charge; Surg. M. J. White, executive officer, Marine Hospital, St. Louis, Mo.; Asst. Surg. J. B. Laughlin, Asst. Surg. R. C. Derivaux, Asst. Surg. W. H. Slaughter, Asst. Surg. H. C. Yarbrough, Asst. Surg. R. E. Wynne, Asst. Surg. K. E. Miller, Asst. Surg. S. L. Christian, Asst. Surg. D. J. Prather, and Asst. Surg. R. L. De Saussure; epidemiologist, A. W. Freeman; assistant epidemiologist, F. E. Harrington; special expert, W. K. Sharp, jr.; field investigators, Quintard Taylor and C. C. Applewhite.

Malaria (headquarters, Marine Hospital, New Orleans, La.): Surg. R. H. von Ezdorf, in charge; sanitary engineer, J. A. A. Le Prince; technical assistants, M. B. Mitzmain and H. A. Taylor; assistant epidemiologist, T. H. D. Griffiths.

Malaria, with special reference to impounded waters: Asst. Surg. Gen. H. R. Carter, marine hospital, Baltimore Md.

Pellagra [headquarters, marine hospital, Savannah, Ga.]: Surg. Jos. Goldberger, in charge; Surg. Edward Francis; Passed Asst. Surg. J. R. Ridlon. Pellagra hospital and laboratory, Spartanburg, S. C.—Passed Asst. Surg. R. M. Grimm, in charge; Asst. Surg. Wm. F. Tanner; Pharmacist L. G. Smith; Biochemist M. X. Sullivan; Asst. Biochemist R. C. Lewis; Asst. Biochemist M. H. Givens; Special Expert C. N. Myers; Food Analyst Rudolph Harries. State sanitarium, Milledgeville, Ga.—Asst. Epidemiologist D. G. Willets. Methodist orphanage, Jackson, Miss.—Asst. Surg. C. H. Waring. State farm, Greenfield, Miss.—Asst. Surg. G. A. Wheeler.

Prevention of trachoma [headquarters, post-office building, Lexington, Ky.]: Surg. John McMullen, in charge; Pharmacist Chas. G. Carlton. Trachoma hospital, Hindman, Ky.—Acting Asst. Surg. R. W. Raynor. Trachoma hospital, London, Ky.—Acting Asst. Surg. J. C. Johnston. Trachoma hospital, Jackson, Ky.—Acting Asst. Surg. T. F. Wickliffe. Trachoma hospital, Coeburn, Va.—Acting Asst. Surg. C. E. Downes.

Rocky Mountain spotted fever [headquarters, Victor, Mont.]: Surg. L. D. Fricks, in charge; Asst. Surg. Liston Paine; Asst. Surg. R. R. Spencer.

Investigation of navigable waters [headquarters, Third and Kilgour Streets, Cincinnati, Ohio]: Passed Asst. Surg. W. H. Frost, in charge; Passed Asst. Surg. Paul Preble; Passed Asst. Surg. L. R. Thompson; Asst. Surg. Jos. Bolten; Asst. Surg. H. F. Smith; Pharmacist F. A. Southard; Plankton Expert W. C. Purdy; Sanitary Engineer J. K. Hoskins; Sanitary Engineer R. E. Tarbett; Sanitary Engineer H. W. Streeter; Sanitary Chemist J. A. Craven; Sanitary Bacteriologist E. M. Meyer; Sanitary Bacteriologist H. M. Campbell; Sanitary Bacteriologist M. V. Veldee; Sanitary Bacteriologist E. E. Smith 2d.

Pollution of coastal waters [headquarters, Hygienic Laboratory, Washington, D. C.]: Surg. H. S. Cumming, in charge; Passed Asst. Surg. W. M. Bryan, Fort Morgan, Ala.; Asst. Surg. C. E. Waller; Sanitary Engineer Chas. A. Haskins; Sanitary Chemist W. F. Wells; Sanitary Bacteriologist H. V. Stewart.

Sewage disposal: Sanitary Engineer L. C. Frank, Sanitary Bacteriologist C. P. Rhynus, Sanitary Bacteriologist H. L. Shoub.

Industrial wastes: Sanitary Engineer H. R. Crohurst, Sanitary Chemist H. B. Hommon, Sanitary Chemist H. C. Colson, Sanitary Bacteriologist W. E. Brown, Sanitary Bacteriologist J. W. McBurney, Sanitary Bacteriologist E. J. Theriault, Sanitary Bacteriologist W. v. D. Tiedeman.

Public health organization and administration: Senior Surg. J. C. Perry, Surg. Carroll Fox.

School hygiene [headquarters, Hygienic Laboratory, Washington, D. C.]: Surg. T. Clark, in charge; Surg. A. D. Foster.

Industrial hygiene [headquarters, marine hospital, Pittsburgh, Pa.]: Surg. J. W. Schereschewsky, in charge; Passed Asst. Surg. Robert Olesen; Asst. Physicist Davis H. Tuck; Sanitary Chemist C. Weisman.

Sanitation of metallurgical plants: Asst. Surg. J. A. Watkins, U. S. Bureau of Mines, Pittsburgh, Pa.

Mine sanitation: Passed Asst. Surg. A. J. Lanza, post-office building, Webb City, Mo.

Industrial hygiene with reference to sickness insurance: Surg. B. S. Warren.

Tuberculosis in Cincinnati industries: Surg. D. E. Robinson, in charge, 209 West Twelfth Street, Cincinnati, Ohio.

Sanitary conditions of the natives of Alaska: Passed Asst. Surg. E. Krulish.

PLAGUE-ERADICATIVE MEASURES.

The following officers were detailed for duty in plague-eradicative measures in the States of Louisiana, California, and Washington:

LOUISIANA.

Surg. R. H. Creel, in charge; Passed Asst. Surg. C. W. Chapin, in charge of laboratory.

Officers in charge of districts.—Passed Asst. Surg. Friench Simpson, Passed Asst. Surg. R. A. Kearny, Asst. Surg. H. F. White, Asst. Surg. J. H. Smith, jr.; Asst. Surg. F. A. Carmelia, Asst. Surg. F. M. Faget, Asst. Surg. C. V. Akin, Asst. Surg. M. S. Lombard, Acting Asst. Surg. M. D. Hollis, Acting Asst. Surg. Percy Ahrons.

CALIFORNIA.

Passed Asst. Surg. J. R. Hurley, in temporary charge; Asst. Surg. N. E. Wayson, in charge of laboratory.

WASHINGTON.

Surg. B. J. Lloyd, in charge; Asst. Surg. D. S. Baughman.

PUBLIC HEALTH LABORATORIES.

Public health laboratories were established at different stations of the service for the prevention of the interstate spread of disease, and the carrying out of sanitary measures, as follows:

Ellis Island, N. Y.—Surg. C. H. Lavinder, in charge.

Fishermans Island, Va.—Surg. H. S. Cumming, in charge.

Pittsburgh, Pa., Marine Hospital.—Surg. J. W. Schereschewsky, in charge.

Cincinnati, Ohio, Third and Kilgour Streets.—Passed Asst. Surg. W. H. Frost, in charge.

Chicago, Ill., Marine Hospital.—Surg. J. O. Cobb, in charge; Sanitary Engineer H. P. Letton.

St. Louis, Mo., Marine Hospital.—Surg. M. J. White, in charge.

Savannah, Ga., Marine Hospital.—Passed Asst. Surg. J. R. Ridlon, in charge.

New Orleans, La., Marine Hospital.—Surg. R. H. von Ezdorf, in charge.

163 Dryades Street (plague).—Passed Asst. Surg. C. W. Chapin, in charge.

Fort Stanton, N. Mex.—Passed Asst. Surg. F. C. Smith, in charge.

Seattle, Wash., No. 416 Central Building.—Surg. B. J. Lloyd, in charge.

San Francisco, Cal., Panama-Pacific Exposition.—Senior Surg. C. C. Pierce, in charge.

Army and De Haro Streets (plague).—Asst. Surg. N. E. Wayson, in charge.

Honolulu, Hawaii.—Surg. F. E. Trotter, in charge.

Mobile, Ala., quarantine, Fort Morgan, Ala.—Passed Asst. Surg. W. M. Bryan, in charge.

Personnel, hygienic laboratory.—At the close of the fiscal year there were on duty in the hygienic laboratory, in addition to the director and assistant director, 3 chiefs of divisions, 7 surgeons, 4 passed assistant surgeon, 1 assistant surgeon, 2 pharmacists, 1 artist, 6 technical assistants, 7 commissioned officers as temporary student assistants, 1 sanitary bacteriologist, 1 organic chemist, 1 sanitary chemist, and 34 attendants.

Quarantine inspector.—One quarantine inspector served throughout the entire year.

Acting assistant surgeons.—The services of 31 acting assistant surgeons have been discontinued during the fiscal year, 5 have died, and 38 have been appointed, leaving on duty at the end of the fiscal year 241 such officers. In addition to this number, 21 acting assistant surgeons have been appointed to make physical examinations of applicants for enlistment and reenlistment in the United States Coast Guard.

Medical inspectors.—One female inspector served during the entire year for the inspection of women passengers at Honolulu, Hawaii.

Internes.—At the beginning of the fiscal year there were 19 internes on duty at the various marine-hospital stations, 21 were appointed, and 19 were separated from the service by reason of resignation, leaving 21 on duty at the close of the fiscal year.

Pharmacists.—At the beginning of the fiscal year there were on duty 46 pharmacists, divided as follows: Pharmacists of the first class, 24; second class, 17; third class, 5. Four pharmacists of the third class were appointed, and three pharmacists of the second class and one of the third class were promoted, leaving at the close of the fiscal year 50 pharmacists on duty, as follows: Pharmacists of the first class 27, second class 15, third class 8.

Pilots and marine engineers.—At the beginning of the fiscal year there were on duty 16 pilots and 20 engineers; 2 pilots resigned and

3 were appointed; 2 marine engineers resigned and 2 were appointed. The number on duty at the close of the fiscal year were as follows: Pilots, 17; marine engineers, 20.

Hospital and quarantine attendants.—At the beginning of the fiscal year 1,064 attendants were employed at the various marine hospitals, quarantine stations, and on epidemic duty, including 65 such employees on duty in the Philippine Islands, and at the close of the fiscal year there were so employed as follows:

Marine hospitals	592
Quarantine (including Porto Rico and Hawaii)	244
Epidemic	448
Field investigations of public health	69
	<hr/>
	1,353
Philippine Islands	65
	<hr/>
Total	1,418

Recapitulation.

Commissioned medical officers	186
Chiefs of divisions, Hygienic Laboratory	3
Advisory board, Hygienic Laboratory	5
Artist	1
Technical assistants	9
Quarantine inspector	1
Acting assistant surgeons	262
Medical inspector	1
Internes	21
Pharmacists	50
Pilots	17
Marine engineers	20
Expert farmer	1
Trained nurses	11
Technical employees, field investigations	39
Attendants	1,418
	<hr/>
Total	2,045

BOARDS CONVENED.

Thirty-one boards were convened at different times and at various stations through the United States for the physical examination of officers of the Revenue-Cutter Service and applicants for entrance therein, 11 for the physical examination of detained aliens, 4 for the examination of commissioned officers to determine their fitness for promotion to the next higher grades of the service, 25 for examination of applicants for appointment as assistant surgeons, and 8 for the examination of pharmacists to determine their fitness for promotion to a higher grade.

The bureau sanitary board has been convened in 11 sessions to pass upon reports of inspections of establishments engaged in the manufacture of vaccines, serums, toxins, etc., prior to recommending a license; and to pass upon advertised remedies and appliances to determine if said advertisements should be excluded from the mails.

One board was convened, under paragraph 56 of the service regulations, for the physical examination of an officer of the service.

MISCELLANEOUS DIVISION.

PUBLICATIONS.

In the fiscal year just ended the Public Health Service printed and distributed more publications than during any other year since the organization of the service. During the period mentioned, 148 publications, dealing with a wide range of public health subjects, were issued, in editions aggregating 1,728,500 copies. This number represents an increase of approximately 241,485 copies over last year's figure. The total expense of printing these publications was \$64,689.49.

Because of the lack of sufficient editions to meet the vastly increased number of applications for public health literature, it was necessary to decline in whole or in part a large number of requests and refer the applicants to the Public Printer, where copies could be purchased at nominal prices.

On account of the increased activities of the service in public health work throughout the United States, and especially in the rural communities where medical aid is not available, or at best obtainable under difficulties, the public has manifested a growing interest in the most improved methods of preventing disease and conserving health and vigor. This interest has found expression in the large number of requests received in the bureau daily for literature of a character designed for use by the general public.

The publications of the service naturally fall into two classes. The first class comprises those of a scientific nature, usually designated Hygienic Laboratory Bulletins. These bulletins are not of general public interest, because of their highly technical contents, and are consequently distributed almost exclusively to libraries, scientists, physicians, and others whose special studies or duties require the assistance of material of this character. These bulletins are limited by law with respect to the size of each edition and number of bulletins to be issued each year.

Into the second class of service publications fall those documents of a more popular type, designed for the public at large and for the information and guidance of health officers in the successful combating of epidemics of disease. It is with reference to this second class of documents especially that much larger editions are urgently needed.

The general character of the publications issued during the year just ended will be seen from the following list, arranged by classes:

ANNUAL REPORT.

This report contains a summary of the service operations for the year and very accurately outlines the duties and labors of this service in its widely varied fields of activities.

HYGIENIC LABORATORY BULLETINS.

96. 1. Report of Investigations of Coastal Waters in the Vicinity of Gulfport and Biloxi, Miss., with special reference to the Pollution of Shellfish. By R. H. Creel.
2. A Comparison of Methods for the Destruction of Oxygen in Waters in Presence of Nitrite. By Elias Elvove.
3. Some New Compounds of the Choline Type: (III) Including Preparations of Monoacetate of α , β Dioxy- β -Methyl Butane. By G. A. Menge.
4. The Detection of White Phosphorus in Matches. By Earle B. Phelps.
5. The Chemical Composition of Rubber in Nursing Nipples and in Some Rubber Toys. By Earle B. Phelps and Albert Stevenson.
6. The Analysis of Thymol Capsules. By Atherton Seidell.
7. Seasonal Variation in the Composition of the Thyroid Gland. By Atherton Seidell and Frederic Fenger.
8. Note on a New Apparatus for Use with the Winkler Method for Dissolved Oxygen in Water. By Hyman L. Shoub.
9. The Pharmacological Action of Some Serum Preservatives. By Carl Voegtlin.

The first article contains a report on the investigations made by Surg. Creel on the pollution of shellfish in certain waters of the Gulf coast, and gives the results of the bacteriological examination and a sanitary survey of the waters. As a result of the studies, certain recommendations are made looking to the betterment of conditions.

The second article, by Dr. Elvove, gives a description of a method for the determination of oxygen in waters in the presence of nitrites and shows that the permanganate of potash modification of the Winkler method is preferable to others in use.

The paper by Dr. Menge contains a description of methods used in the preparation of certain choline derivatives, some of which it is believed will be of value in therapeutics.

The fourth article describes a new method for the detection of white phosphorus in matches elaborated by Prof Phelps so that amounts of white phosphorus as small as 0.1 grain may be detected. The work was undertaken as a result of the examination of materials used in the manufacture of matches, made by the service in connection with the act of Congress providing for a tax upon white phosphorus matches.

Prof. Phelps and Mr. Stevenson give, in the fifth paper, the results of studies on the chemical composition of rubber nipples and toys. The results of these studies show that considerable amounts of antimony, in some cases closely approximating the pharmacopœial dose, enter into the manufacture of certain kinds of rubber used in making rubber nipples.

The sixth and seventh papers give the results of analyses of thymol capsules and seasonal variation in the composition of the thyroid gland. The work is a continuation of previous studies.

The paper by Dr. Shoub describes a new apparatus for use in connection with the Winkler method for dissolved oxygen in water.

In the final paper Prof. Voegtlin confirms work previously done at the Hygienic Laboratory by Dr. Hale on the pharmacological action of some serum preservatives and, in addition, suggests methods by which accidents may be lessened or entirely prevented in the intraspinal injection of serum containing preservatives.

97. 1. Some Further Siphonaptera.

2. A Further Report on the Identification of Some Siphonaptera from the Philippine Islands.

3. The Taxonomic Value of the Copulatory Organs of the Females in the Order Siphonaptera. By Carroll Fox.

In view of the relation of the flea to the transmission of certain diseases, the studies in this paper should be of interest to workers in public health as well as to those especially interested in entomology, for whom the bulletin is especially intended.

98. Digest of Comments on the Pharmacopœia of the United States of America (Eighth Decennial Revision), and on the National Formulary (Third Edition) for the calendar year ending December 31, 1913. By Murray Galt Motter and Martin I. Wilbert.

It is generally recognized that the compilation of these comments has done much to bring about a proper appreciation of the need of securing greater uniformity in the purity and strength of widely used medicines, and the efforts now being made to improve existing conditions are largely based on the information presented in the pages of these bulletins.

99. The Friedmann Treatment for Tuberculosis: A Report of the Board Appointed for its Investigation. By John F. Anderson and Arthur M. Stimson.

These investigations consisted of clinical observations of certain patients treated by Dr. F. F. Friedmann under the direction of the board of the Public Health Service in certain hospitals in New York City, and of certain laboratory studies of a culture given to the board by Dr. Friedmann and said by him to be the one used in the preparation of his treatment for tuberculosis. The results of the investigation did not confirm the claims made by Dr. Friedmann. The board found that the preparation used by him was not strictly devoid of dangerous properties of itself, still less so when injected into tuberculous subjects. The board also found that favorable influence on tuberculous processes by his treatment is certainly not the rule and that serious retrogression has been observed in some cases following treatment.

It was found that the treatment of laboratory animals with the Friedmann organism did not confer protection against tuberculosis.

In the final summing up the board states: "1. The claim of Dr. Friedmann to have originated a specific cure for tuberculosis is not substantiated by our investigation. 2. The claim of Dr. Friedmann that the inoculation of persons and animals with his organism is without harmful properties is disproved."

100. 1. Pituitary Standardization: A Comparison of the Physiological Activity of Some Commercial Pituitary Preparations. By George B. Roth.

2. Examination of Drinking Water on Railroad Trains. By Richard H. Creel.

3. Variation in the Epinephrine Content of Suprarenal Glands. By Atherton Seidell and Frederic Fenger.

The first article contains a comparison of the physiological activities of some commercial pituitary preparations, together with a suggested method for the physiologic assay of this drug. Preliminary studies in the laboratory have shown great variation in the active principle present in different pituitary preparations and this study gives the results of the examination of a number of such preparations. The paper suggests a method for standardizing such preparations.

The second paper in the bulletin gives the results of the examination of a thousand samples of drinking water obtained from common carriers entering the District of Columbia. This is the most complete study of the kind ever made and is of special value in emphasizing the difference in drinking waters supplied on trains and giving examples of the methods of storing ice for cooling drinking waters.

The third article contains further studies on the variation in epinephrine content of suprarenal glands and is a continuation of previous studies that have been published from the laboratory upon this subject.

PUBLIC HEALTH BULLETINS.

66. *Studies in Leprosy, XXV-XXVII.* By M. T. Clegg, G. W. McCoy, and H. T. Hollman.

The results of investigations made at the leprosy investigation station are presented in these three papers. They comprise articles on immunity studies in leprosy, the cultivation of acid-fast bacilli from lepers by the use of symbiotic organisms, and a statistical study of leprosy in Hawaii.

67. *Transactions of the Twelfth Annual Conference of State and Territorial Health Officers with the United States Public Health Service, Washington, June 18, 1914.*

The following subjects were taken up at the conference: Morbidity statistics, transportation of tuberculous persons, rural and school sanitation, railroad and camp sanitation, industrial sanitation, and sanitary administration.

68. *Safe Disposal of Human Excreta at Unsewered Homes.* By L. L. Lumsden, C. W. Stiles, and A. W. Freeman.

This bulletin emphasizes the dangers surrounding the insanitary disposal of human excreta and suggests measures to prevent these dangers. In this connection the different types of sanitary privy are described.

69. *Typhoid Fever: Its Causation and Prevention.* By L. L. Lumsden.

This bulletin discusses in a simple style the causes of typhoid fever and the measures deemed most effective in preventing the disease.

70. *Good Water for Farm Homes.* By A. W. Freeman.

Also designed for the general public, this bulletin discusses the sources of farm water supplies, including wells of various kinds, springs, cisterns, etc., and gives practical advice in making the farm water supply safe.

PUBLIC HEALTH REPORTS.

These reports are issued every Friday, and the weekly editions during the past year reached the maximum number of 16,650 copies.

This weekly report consists of three parts: The first relates to the United States, the second to foreign countries, and the third to current sanitary legislation. The leading articles in these reports are reprinted as "Reprints from the Public Health Reports" in order that more extensive distribution may be made thereof at a much reduced cost. There is a very large public demand for these reprints.

REPRINTS FROM THE PUBLIC HEALTH REPORTS.

As will be seen by referring to the titles below, this class of publications contains popular material of value to the health officer, both State and municipal, and to the public generally:

205. **Court Decisions Relating to Morbidity Reports.** The Right of the Community to Require Physicians to Report Cases of Disease Coming under Their Observation and the Purposes Thereof and Reasons Therefor as Stated by Courts of Last Resort. July 3, 1914.
206. **Biological Products.** Establishments Licensed for the Propagation and Sale of Viruses, Serums, Toxins, and Analogous Products. July 10, 1914.
207. **Trachoma.** A Survey of Its Prevalence in the Mountain Sections of North and South Carolina. By A. D. Foster. July 10, 1914.
208. **The Notifiable Diseases.** Their Prevalence by States During 1913. Diphtheria, Measles, Meningitis (Epidemic Cerebrospinal), Poliomyelitis, Rocky Mountain Spotted (or Tick) Fever, Scarlet Fever, Smallpox, Tuberculosis, Typhoid Fever—cases reported, case rates per 1,000 population, and fatality rates per 100 cases. Compiled by direction of the Surgeon General. July 10, 1914.
209. **Bubonic Plague.** Its Eradication and Prevention in Urban Communities. By R. H. Creel. July 17, 1914.
210. **The Notifiable Diseases.** Prevalence During 1913 in Cities of over 100,000. Diphtheria, Leprosy, Malaria, Measles, Epidemic Cerebrospinal Meningitis, Poliomyelitis, Rabies, Scarlet Fever, Smallpox, Tuberculosis, and Typhoid Fever—cases reported, case rates per 1,000 population, and fatality rates per 100 cases. Compiled by direction of the Surgeon General. July 24, 1914.
211. **School Hygiene.** A Report of a Sanitary Survey of Schools and of Medical Inspection of School Children in Certain Sections of North and South Carolina. By A. D. Foster. July 31, 1914.
212. **Emetin in Amebic Dysentery.** By John M. Holt. July 31, 1914.
213. **Safe Ice.** By Hugh S. Cumming. August 7, 1914.
214. **Studies on the Self-Purification of Streams.** By Earle B. Phelps. August 14, 1914.
215. **The Notifiable Diseases.** Prevalence During 1912 in Cities of 10,000 to 100,000. Diphtheria, Leprosy, Malaria, Measles, Epidemic Cerebrospinal Meningitis, Poliomyelitis, Rabies, Scarlet Fever, Smallpox, Tuberculosis, and Typhoid Fever—cases reported, case rates per 1,000 population, and fatality rates per 100 cases. Compiled by direction of the Surgeon General. August 21, 1914.
216. **Tuberculosis Sanatorium, Fort Stanton, N. Mex.** A report for the year ended June 30, 1914, of the sanatorium maintained by the Public Health Service for the treatment of tuberculous patients. By F. C. Smith. August 28, 1914.
217. **Mosquitoes and Malaria.** Report on a Short Trip in Eastern North Carolina. By Ch. Wardell Stiles. September 4, 1914.
218. **The Cause and Prevention of Pellagra.** A Letter from Joseph Goldberger. **The Treatment of Pellagra.** Clinical Notes on Pellagrins Receiving an Excessive Diet. By W. F. Lorenz.
- The Cerebrospinal Fluid in Pellagra.** By W. F. Lorenz. September 11, 1914.
219. **The Hygiene of Rural Schools.** By Taliaferro Clark. September 11, 1914.
220. **Trachoma.** A Survey of its Prevalence in the Mountain Sections of East Tennessee and Northern Georgia. By Charles A. Bailey. September 18, 1914.
221. **Tuberculosis.** The Financial Aspect of the Sick Leaving Home in Search of a Beneficial Climate. By Thompson Frazer, M. D., Asheville, N. C., September 18, 1914.
222. **Cooperative Public Health Administration.** An Experiment in Small Communities. By Earle B. Phelps. September 25, 1914.
223. **Public Health Administration in Minnesota.** By Carroll Fox. October 2, 1914.
224. **Hookworm Disease.** The Use of Oil of Chenopodium in Its Treatment. By Murray Galt Motter. October 2, 1914.
225. **The Chemical Disinfection of Water.** By Earle B. Phelps. October 9, 1914.

226. **The Source and Supply of Medicines.** With Special Reference to the Interference Caused by the Existing European War. By Martin I. Wilbert. October 9, 1914.
227. **Drug Intoxication.** An economic waste and a menace to public health. By Martin I. Wilbert. October 16, 1914.
228. **The Treatment and Prevention of Pellagra.** By Joseph Goldberger, C. H. Waring and David G. Willets. October 23, 1914.
229. **Polio-myelitis (Infantile Paralysis).** A preliminary note on the epidemic in Vermont during the summer and fall of 1914. By Charles S. Caverly, president, Vermont State Board of Health. October 23, 1914.
230. **Municipal Ordinances, Rules, and Regulations Pertaining to Public Health.** Adopted during 1913 by cities of the United States having a population of over 10,000 in 1910. January 9, 1914, to October 2, 1914, inclusive.
231. **The Notifiable Diseases: Prevalence during 1913 in cities of 10,000 to 100,000.** Diphtheria, Malaria, Measles, Epidemic Cerebrospinal Meningitis, Poliomyelitis, Rabies, Scarlet Fever, Smallpox, Tuberculosis, and Typhoid Fever. Cases reported, case rates per 1,000 population, and and fatality rates per 100 cases.
232. **Bacteriological Standard for Drinking Water.** The Standard Adopted by the Treasury Department for drinking water supplied to the public by common carriers in interstate commerce. November 6, 1914.
233. **The Sanitation of Iquitos, Peru.** By G. M. Converse. November 13, 1914.
234. **Physical Examination of Workers.** By J. W. Schereschewsky. November 20, 1914.
235. **Plague Eradication in California.** Present situation—the disease apparently eradicated. By J. D. Long. November 20, 1914.
236. **Mental Deficiency.** Some of its public health aspects, with special reference to diagnosis. By E. H. Mullan. November 27, 1914.
237. **School Hygiene:** A report of the sanitary inspection of rural schools of East Tennessee and Northern Georgia. By Charles A. Bailey. December 4, 1914.
238. **The Economy of Ground Squirrel Destruction.** By J. D. Long. December 11, 1914.
239. **Cyanide Fumigation of Ships.** Method used at New Orleans. By Norman Roberts. December 11, 1914.
240. **Poisons and Habit-forming Drugs.** A Digest of Laws and Regulations Relating to the Possession, Use, Sale, and Manufacture of Poisons and Habit-forming Drugs enacted during 1913 and 1914, now in force in the United States. By Martin I. Willbert. November 13, 20, and 27, 1914.
241. **Trachoma in the Schools of Porto Rico.** By W. W. King. December 18, 1914.
242. 1. **A New Bacterial Disease of Rodents Transmissible to Man.** By William B. Wherry.
2. **Plague and Plague-Like Diseases.** A report on their transmission by *Stomoxys Calcitrans* and *Musca Domestica*. By N. E. Wayson. December, 18, 1914.
243. **The Tuberculosis Problem in Rural Communities.** Its Modern Aspect and the duty of Health Officers. By A. Adolphus Knopf, M. D., New York, N. Y. December 18, 1914.
244. **Impounded Water:** Some general considerations on its effect on the prevalence of malaria. By H. R. Carter. December 25, 1914.
245. **An Epidemiological Study of a Plague Focus.** By Charles V. Akin. December 25, 1914.
246. **Tuberculosis:** The home hospital treatment. By Donald B. Armstrong. January 1, 1915.
247. **Sewage Disinfection for Vessels and Railway Coaches.** By Leslie C. Frank. January 1, 1915.
248. **Impounded Waters:** Their effect on the prevalence of malaria—Survey at Blewetts Falls. By H. R. Carter. January 1, 1915.
249. **The Spread of Tuberculosis.** Report on the Spread of Infection in Certain Tuberculosis Families in Five Counties in Minnesota. H. G. Lampson, M. D. January 8, 1915.
250. **Sickness Insurance:** Its relation to public health and the common welfare. By B. S. Warren. January 8, 1915.
251. **Rocky Mountain Spotted Fever:** A report on its investigation and of measures undertaken for its eradication during 1914. By L. D. Fricks. January 15, 1915.

252. **Public Health Administration in West Virginia.** A study of the health laws and public health administration of the State of West Virginia. By Taliaferro Clark. January 22, 1915.
253. **Biological Products.** Establishments Licensed for the Propagation and Sale of Viruses, Serums, Toxins, and Analogous Products. January 22, 1915.
254. **The Purity and Strength of Household Remedies.** Variations in Purity and Strength of Widely Used Drugs and Preparations a Possible Source of Danger to the Patient. By Martin I. Wilbert. January 29, 1915.
255. **Public Health Administration in the State of Washington.** By Carroll Fox. February 5, 1915.
256. **The Limitations to Self-Medication.** Uses and Abuses of Proprietary Preparations and Household Remedies. By Martin I. Wilbert. February 12, 1915.
257. **Impounded Waters.** A Study of Such Waters on the Coosa River in Shelby, Chilton, Talladega, and Coosa Counties, Ala., to Determine the Extent to which They Affect the Production of Anophelines, and of the Particular Conditions which Increase or Decrease Their Propagation. By J. A. A. Le Prince. February 12, 1915.
258. **Malaria Control.** Drainage as an Antimalarial Measure. By J. A. A. Le Prince. February 19, 1915.
259. **Rat Proofing the Public Docks of New Orleans.** A Report on Its Possibility and Cost. By H. P. Letton. February 19, 1915.
260. **Control of Malaria.** Oiling as an Antimosquito Measure. By J. A. A. Le Prince. February 26, 1915.
261. **Hypochlorite Treatment of Water Supplies.** Portable Plant and Field Equipment for Its Administration. By H. A. Whittaker. February 26, 1915.
262. **Venereal Disease.** Its Probable Prevalence. An attempt to reach a definite basis of statistical value. By Charles S. Banks. February 26, 1915.
263. **Trachoma.** A Survey of Its Prevalence in the Mountain Section of Eastern Kentucky. By John McMullen. March 5, 1915.
264. **State Laws and Regulations Pertaining to Public Health Adopted During the Year 1913.** Reprint from the Public Health Reports, 1913 and 1914.
265. **Interstate Migration of Tuberculous Persons.** Its bearing on the public health, with special reference to the States of North and South Carolina. By A. D. Foster. March 12, 1915.
266. **Interstate Migration of Tuberculous Persons.** Its bearing on the public health, with reference to the State of California. By P. M. Carrington. March 19, 1915.
267. **Efforts to Curb the Misuse of Narcotic Drugs.** A Comparative Analysis of the Federal and State Laws Designed to Restrict or to Regulate the Distribution and Use of Opium, Coca, and Other Narcotic or Habit-Forming Drugs. By Martin I. Wilbert. March 26, 1915.
268. **State and Insular Health Authorities.** April 2, 1915.
269. **Interstate Migration of Tuberculous Persons.** Its bearing on the public health, with special reference to the States of Texas and New Mexico. By Earnest A. Sweet. April 9, 16, and 23, 1915.
270. **Bubonic Plague.** A Menace to American Seaports. By W. C. Rucker. April 16, 1915.
271. **Typhus Fever.** Its Etiology and the Methods of Its Prevention. By John F. Anderson. April 30, 1915.
272. **Anopheline Surveys.** Methods of Conduct and Relation to Antimalarial Work. By R. H. von Ezzdorf. April 30, 1915.
273. **Municipal Ordinances, Rules, and Regulations Pertaining to Public Health.** Adopted during 1914 by cities of the United States having a population of over 10,000 in 1910. August 7, 1914, to April 16, 1915, inclusive.
274. **Plague.** Its Geographic Distribution and Its Menace to the United States. By W. C. Rucker. May 14, 1915.
275. **Public Health Administration in Illinois.** By S. B. Grubbs. May 21, 1915.
276. **Interstate Sanitary Districts.** Their Establishment by the Secretary of the Treasury in Connection with the Enforcement of the Interstate Quarantine Laws and Regulations. May 28, 1915.
277. **Malaria in the United States.** Its Prevalence and Geographic Distribution. By R. H. von Ezzdorf. May 28, 1915.
278. **The Migratory Habits of Rats.** With Special Reference to the Spread of Plague. By R. H. Creel. June 4, 1915.

279. **State Laws and Regulations Pertaining to Public Health.** Adopted during the year 1914.
280. **The Practicing Physician.** His Relation to Public Health Administration. By John W. Trask. June 11, 1915.
281. **Note on a Rodent Plague Focus.** By W. C. Rucker. June 11, 1915.
282. **Tuberculosis.** The Municipal Care and Supervision of the Tuberculous. Report made by committee to the Monday Evening Club of Washington. June 18, 1915.
283. **Interstate Migration of Tuberculous Persons.** Its bearing on the public health, with special reference to the States of Arizona and Colorado. By A. J. Lanza. June 18, 1915.
284. **Public Health Administration in Toledo.** By Carroll Fox. June 25, 1915.

SUPPLEMENTS TO THE PUBLIC HEALTH REPORTS.

These supplements do not form a part of the Public Health Reports, but are printed as supplements thereto in order that a wider distribution may be had. They are popular in style and treat of various diseases and subjects of interest and value to the public. The aim of this class of documents is to present to the individual in non-technical language the cause, effect, and prevention of various conditions and diseases. The following numbers were issued during the year:

17. **Sanitary Survey of Indiana Industries Employing Woman Labor.** By M. J. White. July 17, 1914.
18. **Malaria—Lessons on Its Cause and Prevention.** (For use in schools.) By H. R. Carter. July 17, 1914.
19. **Yellow Fever: Its Epidemiology, Prevention, and Control.** (Lectures Delivered at the United States Public Health Service School of Instruction by H. R. Carter, Senior Surgeon, United States Public Health Service. Lecture No. 1, March 26, 1914; lecture No. 2, March 27, 1914.) September 11, 1914.
20. **Leprosy: Its Treatment in the Philippine Islands by the Hypodermic Use of a Chaulmoogra Oil Mixture.** By Victor G. Heiser. October 16, 1914.
21. **Scarlet Fever: Its Prevention and Control.** By J. W. Schereschewsky. November 27, 1914.
22. **Resolutions Concerning Disposal of Human Excreta at Unsewered Homes.** June 18, 1915.

MISCELLANEOUS PUBLICATIONS.

Only two publications were issued in this series during the fiscal year:

12. **List of Publications, Public Health Service.** June, 1914. Paper.
15. **Organization Chart of the United States Public Health Service.** January, 1915.

LIBRARY.

During the year the library of the bureau was materially enlarged by the purchase and donation of a number of valuable volumes dealing with medical and allied subjects. In addition to these volumes, the bureau was kept advised of the current advance of the profession by the subscription to 46 journals. Many of these journals were bound and made a part of the reference library.

NEEDS OF THE SERVICE.

ADDITIONAL COMMISSIONED OFFICERS.—In the estimates submitted to Congress for the fiscal year 1916 an item of \$50,000 for the pay of additional commissioned officers was included. This sum would have permitted of the appointment of 22 medical officers in the entrance grade of assistant surgeon. Favorable action on this estimate, however, was not taken by Congress.

The extension of service operations during the past two years has been principally along the lines of public-health work. The number of officers needed for service in the field has steadily increased, and the interest that has been aroused in public-health matters is constantly growing. Requests received from State and local health agencies for assistance in the solution of health problems have far surpassed in number similar requests during any like period in the history of the service. It is through cooperation with such agencies that the most effective work for the betterment of health conditions generally is to be accomplished. An effort has been made to render assistance and advice wherever possible, but on account of the limited number of available medical officers the bureau has in some instances been unable to take advantage of opportunities for the accomplishment of valuable and beneficial scientific work. In the investigations of diseases of man, the pollution of navigable streams, lakes, and coastal waters, the sanitation of interstate carriers, and the eradication of epidemic diseases the lack of a sufficient number of trained officers has been a problem throughout the year. Additional duties have been imposed upon the service by the extension of relief benefits to the newly created Coast Guard, and the physical examination of all American sailors applying for the rating of "able seaman" has been undertaken on request of the Department of Commerce, under the provisions of the seamen's act. The physical examination of certain classes of applicants for appointment under the civil service has also been assumed, at the request of the Civil Service Commission. It is therefore hoped that adequate provision will be made for this important service need.

ADDITIONAL CLERICAL ASSISTANCE.—The need for increased clerical assistance in the bureau has followed the growth of service work in the field. While certain additional employees have been provided during the past three years, the increase in the bureau force has not been commensurate with the rapidly growing volume of administrative and detailed routine work incidental to the development of service functions. The estimates that have been submitted for the coming fiscal year represent the most careful consideration of the increases actually necessary to the proper conduct of the bureau's work.

RURAL SANITATION, TYPHOID FEVER, MALARIA.—For studies of rural sanitation and of malaria especially is there need of larger

facilities. With the possible exception of pellagra, there is no single disease which so vitally affects the Southern States as malaria and none which causes so great an economic loss. For example, in the State of Mississippi alone in 1914 there were over 116,000 cases of this disease. As a result of investigations during the year it has been shown to be highly improbable that hibernating mosquitoes carry the infection through the winter. It has also been shown that the disease can be eradicated from infected communities at comparatively reasonable cost. During the course of rural-sanitation studies it has been demonstrated also that in whole counties the number of cases of typhoid fever can be reduced to one-fifth of their former prevalence, and that the indirect results may be even greater. For these two large and promising fields of study, and in order to utilize these important discoveries, an additional sum of \$100,000 annually should be made available. With such a sum the entire country could be made to feel the benefits of the work within a very few years.

OCCUPATIONAL DISEASES.—There is need also of enlargement of the studies of occupational diseases and the causes giving rise to them. As these studies proceed it is evident that the problems awaiting solution are complex. They require more than ordinary inspections of factories and statistical compilations. Highly technical laboratory studies are necessary, and methods and standards must be devised and their adoption encouraged to the end that the health of workmen shall be conserved and a better understanding on such matters arrived at between employer and employee. Funds for this work should be largely increased.

POLLUTION OF COASTAL WATERS.—As the studies of the pollution of shellfish-bearing waters have advanced it has become increasingly evident that the areas of undue pollution should be rapidly determined. For this purpose, surveys of all shellfish-bearing waters should be made without delay. An additional sum is accordingly being included in the estimates of appropriations for this purpose. No article of food, perhaps, enters more universally into interstate commerce than oysters. In recent years considerable misunderstanding has arisen as to the actual conditions under which they are grown and handled. As a result, this industry, involving millions of dollars, has suffered losses which can be saved. At the same time, the health of the country can be safeguarded.

REPAIRS TO PUBLIC HEALTH SERVICE STATION AT CINCINNATI, OHIO.—With the development of river-pollution investigations at Cincinnati, that place has been found to be well suited for the field headquarters for such work. In order to conserve the property in which it is housed (formerly the marine hospital, and owned by the Government) and in the interest of the work now being conducted, an appropriation of \$20,000 should be made to repair the main building and to demolish dilapidated wings of the structure.

MANUFACTURE OF VIRUSES, SERUMS, TOXINS, ETC.—On July 1, 1902, the law to regulate the propagation and sale of viruses, serums, toxins, and analagous products was approved, but no appropriation made for its enforcement. At that time, however, there were only 12 establishments to license, and less than 6 products for which license was required. Since then, the growth of the use of biologic

products in the prevention and cure of diseases has been so rapid that there are now 41 licensed establishments in this country and abroad, and over 60 different products propagated therein. There is need of closer supervision of these establishments, and examinations of a greater number of samples of their products, and an appropriation of \$25,000 should be made available for the purpose. The manufacture of viruses, serums, toxins, etc., is surrounded by so many dangers to the public health, that every possible precaution must be exercised to supervise the various processes involved.

ADDITIONAL BUILDING FOR HYGIENIC LABORATORY.—It is desired to renew the recommendation, made for several years past, for an additional building for the use of the Hygienic Laboratory in Washington. Although the work at that institution has been greatly extended since the passage of the act of August 14, 1912, and the personnel increased, no provision in the way of additional laboratory or office space has been made. The scientific work of the laboratory in the past has been such that the results there achieved are accepted as authoritative throughout this country and abroad. In such an institution, where accuracy, precision, and systematic organization are so vitally important, overcrowding becomes a really serious condition. The estimated sum of \$175,000 for the purpose of constructing a new building is again respectfully urged.

SEGREGATION AND CARE OF LEPERS.—It becomes more apparent each year that adequate provision must be made for the segregation and care of cases of leprosy in the continental United States. In 1913 an investigation conducted by correspondence by the Public Health Service definitely located 148 cases of leprosy in the United States. The bulk of these cases were persons native born. While leprosy is not classed as an acutely infectious disease it is considered by authorities on the subject to be communicable. The danger from this comparatively small number of cases, however, is that many of them move from place to place, remaining in one locality only until the nature of their malady is discovered and then removing to another section where, because their affliction is not known, they can for a time at least escape the isolation and ostracism due to the prevalent dread of this disease. In a few States homes for these unfortunates have been established; but the cases that are constantly moving constitute an interstate sanitary problem.

In the third session of the Sixty-third Congress a bill (H. R. 20040) was introduced providing for the national care of lepers. With slight amendments it was passed by the House of Representatives, but was not acted upon by the Senate prior to the adjournment of Congress. This bill had the approval of the department. It is hoped that the matter will again be considered by Congress, to the end that a solution of this problem may be effected.

NATIONAL QUARANTINE SYSTEM.

In section 8 of the act approved February 15, 1893, Congress gave sanction to the national control of quarantine by providing:

That whenever the proper authorities of a State shall surrender to the United States the use of the buildings and disinfecting apparatus at a State quarantine station the Secretary of the Treasury shall be authorized to receive them and to pay a reasonable compensation to the State for their use if, in his opinion, they are necessary to the United States.

Between the years 1888 and 1915 the quarantine function at 67 different places has been transferred to national control. It has been proven that as a result of these transfers economy, efficiency, and uniformity in quarantine procedure have been accomplished. During the fiscal year 1915 the quarantine function at Boston, Mass., was assumed by the Public Health Service under the provisions of the act quoted above. At the present time the only ports where there is no Federal quarantine are New York and Baltimore.

At no time within recent years have the so-called epidemic diseases been so prevalent in Europe as they are to-day. Cholera, typhus, and plague have been reported at various times and places, and because of unsettled conditions the opportunity for the spread of these diseases has been favorable. At the present time immigration from Europe has greatly decreased, and for this reason the danger of the importation of these diseases has diminished. When conditions again become normal, however, the tide of European immigration will doubtless swell very rapidly, and it is then that the utmost care will be necessary to guard against them. For this reason it is believed that the supervision of quarantine measures at all ports should be brought under Federal control at the earliest possible time.

It should also be mentioned that the United States is a party to two general international sanitary treaties to which practically every other nation of the world is also signatory. Under these treaties international quarantine regulations have been formulated. In order that these regulations may be uniformly complied with at all ports of the United States, it is desirable that the quarantine function shall be under the control of the National Government.

BUREAU LIBRARY.

The facility of reference to the medical and scientific information contained in the library of the bureau is seriously handicapped by inadequate quarters. It has been recommended, and an estimate has heretofore been submitted to Congress, provided for the remodeling of the annex adjoining the Butler Building. This building, properly altered, would provide satisfactory space for the bureau library and also much needed quarters for one of the divisions of the bureau.

RUPERT BLUE,
Surgeon General.

APPENDIX.

FINANCIAL STATEMENT.

RECEIPTS AND EXPENDITURES, PUBLIC HEALTH SERVICE, FOR THE FISCAL
YEAR ENDED JUNE 30, 1915.

Appropriation: "Public Health Service, 1915."

Subheads of appropriations.	Appropriations and repayments.	Expenditures.	Balance June 30, 1915.
Pay, etc., commissioned officers and pharmacists.....	\$679,858.00	\$638,261.56	\$41,596.44
Pay of acting assistant surgeons.....	200,000.00	184,824.88	15,175.12
Pay of other employees.....	502,606.00	493,513.38	9,092.62
Freight, transportation, etc.....	50,000.00	26,217.14	3,782.86
Fuel, light and water.....	75,000.00	74,475.34	524.66
Furniture, etc.....	8,000.00	7,928.33	71.67
Purveying depot supplies (appropriation \$45,000).....	51,596.99	51,595.02	1.97
Maintenance Hygienic Laboratory.....	20,000.00	19,778.57	221.43
Maintenance marine hospitals (appropriation \$256,000).....	266,349.93	262,576.66	3,773.27
Care of seamen, etc. (appropriation \$126,000).....	128,879.55	123,050.92	5,828.63
Books.....	500.00	495.18	4.82
Disbursements.....		1,858,687.67	
Encumbrances.....		24,029.31	
Total (appropriation \$1,942,964).....	1,962,790.47	1,882,716.98	80,073.49

¹ Includes \$1,200 transferred to "Contingent expenses, Treasury Department, stationery, 1915."

NOTE.—For expenditures by stations under marine hospitals and relief, see Statistical Table No. 2.

Appropriation: "Preventing the spread of epidemic diseases, 1915."

Amount of appropriations..... \$520,000.00
Repayments..... 256.99

Total..... 520,256.99

Expenditures:

Disbursements..... ¹\$458,638.43
Encumbrances..... 5,909.00

As follows:

Plague eradivative measures—

Louisiana..... 341,354.34
California..... 51,496.81
Washington..... 8,335.34
Porto Rico..... 1,230.00

Prevention of trachoma—

Kentucky..... 21,985.69
Virginia..... 921.85

Preventive measures—

Cuba..... 10,273.12
Steamer *Continental*..... 15,896.00
Boston quarantine..... 1,879.20
New Orleans..... 1,261.34
Philadelphia..... 1,214.95
China, Japan, Italy, etc..... 2,762.41
Travel..... 3,250.00
Vaccine, telegrams, etc..... 2,686.38

464,547.43

Balance June 30, 1915..... 55,709.56

¹ Includes \$200 transferred to "Contingent expenses, Treasury Department, stationery, 1915."

NOTE.—Payments amounting to \$95,734.10 were made from pay items of appropriation "Public Health Service, 1915," account of epidemic duty.

Appropriation: "Quarantine Service, 1915."

Amount of appropriation.....	\$155,000.00
Repayments	944.85
Total	155,944.85
Expenditures:	
Disbursements..... ¹	\$143,817.57
Incumbrances.....	9,221.02
	153,038.59
Balance June 30, 1915.....	2,906.26

Expenditures by stations.

Name of station.	Pay and allowances, officers and employees. ²	Maintenance.	Total maintenance, pay, and allowances.
Alexandria, Va.....	\$10.00		\$10.00
Beaufort, S. C.....	1,500.00	\$241.54	1,741.54
Biscayne Bay, Fla.....	1,572.50		1,572.50
Boca Grande, Fla.....	1,980.00	783.58	2,763.58
Brunswick, Ga.....	2,721.67	1,925.96	4,647.63
Cape Charles, Va.....	6,845.99	6,715.29	13,561.28
Cape Fear, N. C.....	6,305.83	2,851.78	9,157.61
Cedar Keys, Fla.....	300.00		300.00
Charleston, S. C.....	8,084.17	6,878.39	14,962.56
Columbia River, Oreg.....	11,040.00	8,640.29	19,680.29
Coos Bay, Oreg.....	20.00		20.00
Cumberland Sound, Fla.....	3,180.00	97.35	3,277.35
Delaware Bay and River, Del.....	9,062.55	3,066.25	12,128.80
Delaware Breakwater, Del.....	4,098.33	1,820.48	5,918.81
Eagle Pass, Tex.....	2,005.00		2,005.00
Eastport, Me.....	1,286.67	1.10	1,287.77
Eureka, Cal.....	366.00	48.10	414.10
Fort Bragg, Cal.....	20.00		20.00
Galveston, Tex.....	4,050.72	8,850.93	12,901.65
Georgetown, S. C.....	240.00	79.34	319.34
Gulf, Miss.....	7,646.99	3,685.58	11,332.57
Hawaii.....	29,288.83	9,706.81	38,995.64
Key West, Fla.....	4,458.89	2,690.90	7,149.79
Laredo, Tex.....	1,681.34	273.48	1,954.82
Miscellaneous.....		4,233.63	4,233.63
Mobile, Ala.....	9,706.34	4,427.02	14,133.36
New Bern, N. C.....	200.01		200.01
New Orleans, La.....	22,790.51	12,427.17	35,217.68
Pascagoula, Miss.....	550.00	35.30	585.30
Pensacola, Fla.....	7,091.56	4,301.64	11,393.20
Perth Amboy, N. J.....	1,679.16	1,270.53	2,949.69
Port Harford, Cal.....	600.00		600.00
Port Inglis, Fla.....	30.00	330.00	360.00
Portland, Me.....	8,369.99	1,698.24	10,068.23
Porto Rico.....	27,984.84	10,914.21	38,899.05
Port Royal, S. C.....	1,478.34	239.56	1,717.90
Port Townsend, Wash.....	14,721.84	5,003.94	19,725.78
Providence, R. I.....	8,364.33	6,735.05	15,099.38
Reedy Island, Del.....	4,752.17	2,883.65	7,635.82
St. Andrews, Fla.....	420.00	221.75	641.75
St. Georges Sound, Fla.....	2,680.00	224.00	2,904.00
St. Johns River, Fla.....	1,980.00	1,130.72	3,110.72
St. Joseph, Fla.....	40.00	61.00	101.00
San Diego, Cal.....	6,480.00	3,600.01	10,080.01
San Francisco, Cal.....	28,910.16	19,220.76	48,130.92
San Pedro, Cal.....	945.00	892.74	1,837.74
Santa Barbara, Cal.....	15.00		15.00
Savannah, Ga.....	8,224.51	5,064.36	13,888.87
Tampa Bay, Fla.....	7,665.00	4,549.05	12,214.05
Washington, N. C.....	616.67		616.67
Leprosy Hospital.....	18,683.33	4,617.11	23,300.44
Total.....	292,744.24	153,038.59	445,782.83

¹ Includes \$500 transferred to "Contingent expenses, Treasury Department, stationery, 1915."² Paid from pay items appropriation "Public Health Service, 1915."

Appropriation: "Field investigations of public health, 1915."

Amount of appropriation-----		\$200,000.00
Expenditures:		
Disbursements-----	\$180,215.84	
Encumbrances-----	3,813.04	
	<hr/>	
As follows:		
Rural sanitation-----	23,402.52	
Malaria-----	16,566.84	
Pellagra-----	32,801.61	
Investigation of navigable waters-----	48,278.30	
Pollution of coastal waters-----	29,805.57	
Sewage disposal-----	5,132.93	
Industrial wastes-----	3,698.57	
Public health organization and administra- tion-----	3,518.13	
School hygiene-----	3,345.52	
Industrial hygiene-----	9,480.70	
Tuberculosis in Cincinnati industries-----	2,816.41	
Miscellaneous, travel, etc-----	5,181.78	
	<hr/>	184,028.88
Balance June 30, 1915-----		15,971.12

NOTE.—Payments amounting to \$36,942.89 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1915," on account of field investigations.

Appropriation: "National quarantine and sanitation."

Balance July 1, 1914-----		\$18,719.19
Expenditures-----	\$6,356.87	
Transferred to Supervising Architect-----	11,409.00	
	<hr/>	17,765.87
Balance June 30, 1915-----		953.32

Appropriation: "Interstate quarantine service, 1915."

Amount of appropriation-----		\$15,000.00
Expenditures-----		11,944.85
	<hr/>	
Balance June 30, 1915-----		3,055.15

NOTE.—Payments amounting to \$1,083.34 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1915," on account of interstate quarantine.

Appropriation: "Special studies of pellagra, Public Health Service, 1914-15."

Balance July 1, 1914-----		\$47,000.00
Expenditures-----		44,240.34
	<hr/>	
Balance June 30, 1915-----		2,759.66

NOTE.—Payments amounting to \$6,444.23 were made from appropriation "Pay, etc., commissioned officers and pharmacists, Public Health Service, 1915," on account of special studies.

Appropriation: "Relief and transportation of American citizens in Mexico, Public Health Service."

Balance July 1, 1914-----		\$1,469.35
Expenditures-----		895.07
	<hr/>	
Balance June 30, 1915-----		574.28

Appropriation: "Providence (R. I.) Quarantine Station, 1914-15."

Balance July 1, 1914	\$25,000.00
Expenditures	24,053.44
Balance June 30, 1915	946.56

Appropriation: "Salaries, office of Surgeon General, Public Health Service, 1915."

Amount of appropriation	\$51,870.00
Expenditures	51,363.12
Balance June 30, 1915	501.88

Construction appropriations.

LEPROSY HOSPITAL, HAWAII.

Balance June 30, 1915 (act Mar. 3, 1905)	\$16,956.35
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MARINE HOSPITALS.

Cleveland, Ohio:

Balance June 30, 1915 (act Mar. 4, 1909)	100.00
Balance June 30, 1915 (act Mar. 4, 1907)	374.95

Fort Stanton, N. Mex.:

Balance June 30, 1915 (act Aug. 24, 1912)	3.20
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Under Supervising Architect (amounts appropriated):

Fort Stanton, N. Mex. (act Aug. 1, 1914)	800.00
New Orleans, La. (act Aug. 1, 1914)	1,500.00
San Francisco, Cal. (act Aug. 1, 1914)	5,000.00

QUARANTINE STATIONS.

San Francisco (act June 30, 1906):

Balance July 1, 1914	3,201.35
Expenditures	1,689.64

Balance June 30, 1915	1,511.71
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[Balances June 30, 1915.]

Brunswick, Ga. (act June 25, 1910)	1,708.87
Charleston, S. C. (act Mar. 4, 1909)	634.46
Columbia River (act June 25, 1910)	745.47
Delaware Breakwater (act Mar. 4, 1907)	857.00
Gulf (act Mar. 4, 1907)	353.35
Honolulu (act Mar. 4, 1907)	390.52
Pensacola (act Mar. 4, 1907)	18.02
Reedy Island (act Mar. 4, 1909)	66.71
San Francisco (act May 27, 1908)	180.75
Savannah (act Mar. 4, 1909)	410.85
Under Supervising Architect (amounts appropriated):	
Cape Fear (act Aug. 1, 1914)	25,000.00
Galveston, Tex. (act Oct. 22, 1913)	50,000.00
Honolulu (act Aug. 1, 1914)	3,200.00
New Orleans (act Aug. 1, 1914)	12,000.00
San Francisco (act Aug. 1, 1914)	35,000.00
Tampa Bay (act Oct. 22, 1913)	65,000.00

STATISTICAL TABLES.

TABLE 1.—Comparative table of number of patients annually treated, 1868 to 1915.

Fiscal year.	Sick and disabled seamen furnished relief.	Fiscal year.	Sick and disabled seamen furnished relief.
Prior to organization:		After reorganization—Continued.	
1868.....	11,535	1892.....	53,610
1869.....	11,356	1893.....	53,317
1870.....	10,560	1894.....	52,803
After reorganization:		1895.....	52,643
1871.....	14,256	1896.....	53,804
1872.....	13,156	1897.....	54,477
1873.....	13,529	1898.....	52,709
1874.....	14,356	1899.....	55,489
1875.....	15,009	1900.....	56,355
1876.....	16,808	1901.....	58,381
1877.....	15,175	1902.....	56,310
1878.....	18,223	1903.....	58,573
1879.....	20,922	1904.....	58,556
1880.....	24,860	1905.....	57,013
1881.....	32,613	1906.....	54,363
1882.....	36,184	1907.....	55,129
1883.....	40,195	1908.....	54,301
1884.....	44,761	1909.....	53,704
1885.....	41,714	1910.....	51,443
1886.....	43,822	1911.....	52,209
1887.....	45,314	1912.....	51,078
1888.....	48,203	1913.....	50,604
1889.....	49,518	1914.....	53,226
1890.....	50,671	1915.....	55,782
1891.....	52,992		

TABLE 2.—*Transactions at marine hospitals and other relief stations, fiscal year 1915.*

	Total number of patients treated.	Patients in hospitals July 1, 1914.	Admitted during the year.	Total number treated in hospital.	Discharged.	Died.	Remaining in hospital June 30, 1915.	Number of days' relief in hospital.	Number of patients furnished office relief.	Number of times office relief was furnished.	Number of persons physically examined, including pilots.	Number of foreign seamen treated.	Days hospital relief furnished foreign seamen.	Amount expended.
Total (first, second, third, and fourth-class stations).	55,781	1,098	14,341	15,439	13,823	459	1,157	446,227	40,343	68,466	7,357	484	6,623	\$887,113.41
<i>First-class stations.</i>														
Baltimore, Md.	3,270	53	603	656	579	25	52	24,302	2,614	4,150	328	.....	.....	38,781.58
Boston, Mass.	2,382	53	586	639	569	14	56	22,460	1,943	3,602	402	.....	.....	40,505.01
Buñao, N. Y.	2,088	14	337	331	327	13	11	8,110	1,737	3,100	101	29	391	20,869.11
Cairo, Ill.	.....	4	150	134	139	3	12	2,893	1,532	613	6	.....	.....	15,227.15
Chicago, Ill.	1,725	42	634	676	608	19	49	21,610	1,049	1,826	112	.....	.....	45,856.19
Cleveland, Ohio.	1,895	34	319	353	319	15	19	9,403	1,542	2,465	106	.....	.....	22,258.51
Detroit, Mich.	1,541	32	459	491	455	10	26	10,805	1,060	1,535	115	.....	.....	26,677.21
Evansville, Ind.	952	11	201	212	195	6	10	6,679	1,740	1,258	18	.....	.....	13,872.69
Fort Stanton, N. Mex.	329	186	143	329	79	48	202	79,251	.....	.....	.....	14	173	123,713.67
Key West, Fla.	476	5	144	149	128	8	13	2,961	327	560	14	14	.....	14,735.45
Louisville, Ky.	600	20	168	188	162	11	15	5,444	412	911	23	.....	.....	14,834.52
Memphis, Tenn.	1,098	11	230	241	216	9	16	4,874	857	1,619	65	.....	.....	15,678.27
Mobile, Ala.	974	32	313	345	303	14	28	9,429	629	1,139	95	63	.....	19,666.69
New Orleans, La.	2,339	42	613	655	564	27	64	20,351	1,684	3,159	233	148	891	33,072.83
New York, N. Y.	4,337	98	1,533	1,631	1,488	40	103	38,583	2,706	4,823	1,394	8	40	69,548.83
Pittsburgh, Pa.	607	2	114	116	97	7	12	4,401	491	762	39	.....	.....	13,841.20
Portland, Me.	559	14	182	196	180	6	10	6,457	363	490	104	4	38	22,333.09
Port Townsend, Wash.	478	44	319	363	303	15	45	17,707	115	236	17	19	282	17,551.40
St. Louis, Mo.	1,040	24	230	254	217	13	24	8,336	786	1,419	49	.....	.....	21,137.50
San Francisco, Cal.	3,474	69	1,238	1,284	1,124	37	77	28,802	2,236	5,240	620	37	589	51,715.10
Savannah, Ga.	1,423	34	467	497	409	10	38	11,957	1,014	1,414	109	11	152	19,566.76
Vineyard Haven, Mass.	1,471	11	240	251	157	3	11	4,022	133	140	4	.....	.....	13,908.53
Wilmington, N. C.	351	6	125	131	117	2	12	3,016	220	294	18	12	138	11,015.90
Total	33,112	841	9,091	9,932	8,672	355	905	352,018	23,180	40,285	3,872	345	4,487	688,397.19

Second, third, and fourth class
stations.

Albany, N. Y.	92	5	18	23	22	1	445	69	182				798.64
Ancon, Canal Zone.	70	3	43	70	61	7	1,097						4,111.51
Apalachicola, Fla.	112	1	67	44	40	4	498	68	297	107			1,501.67
Ashland, Wis.	76	1	15	16	16		383	60	70				666.50
Ashtabula, Ohio.	202		22	22	22		155	180	320	7			708.58
Astoria, Oreg.	151		38	38	35	2	453	113	161	17			1,131.25
Bangor, Me.	45	1	13	14	14		124	31	47	19			655.00
Barnstable, Mass., and suburbs.	10		11	11	9		288	26	26				15.00
Bay City, Mich.	71		1	1			7	33	59	1			548.00
Beaufort, N. C.	20							70	80				447.55
Beaufort, S. C.	20							20	20				20.00
Bellingham, Wash.	54		9	9	8	1	91	45	118	13	4	16	440.75
Boothby Harbor, Me.	67	1	15	16	14	1	244	45	118	13			640.00
Bridgeport, Conn.	21	1	20	21	20	1	395						404.00
Brunswick, Ga.	62		17	17	15	2	235						843.75
Burlington, Iowa	27		15	15	14	1	211	12	52	6	9	113	451.03
Cambridge, Md.	48		35	35	34	1	473	13	13				722.00
Cedar Keys, Fla.	17												49.30
Charleston, S. C.	537		77	77	72	3	1,130	460	707	90			5,390.67
Chattanooga, Tenn.	5		5	5	5		67						190.00
Cincinnati, Ohio.	141		7	7	6	1	96	134	246	24			1,016.11
Crisfield, Md.	115		1	1	1		11	114	147	1			
Delaware Breakwater, Del.	191	1	7	8	6	1	48	183	221	53			
Duluth, Minn.	368	3	19	22	19	2	282	347	382				283.36
Eastport, Me.	69		2	2	1	1	2	67	113				
Edenton, N. C.	35							35	57				
Elizabeth City, N. C.	138							138	250	201			
Ellsworth, Me.	3							3	5				888.50
Erie, Pa.	175	2	40	42	39	1	664	133	191	13			5.00
Escanaba, Mich.	29	1	5	6	6		57	23	33				357.00
Eureka, Cal.	52		11	11	11		89	41	77				593.50
Fernandina, Fla.	30		2	2	2		25	28	49				337.50
Gallipolis, Ohio.	126	2	33	35	33	2	708	91	175	15			1,352.00
Galveston, Tex.	1,282	17	377	394	372	8	5,275	888	1,424	105			8,692.49
Georgetown, S. C.	297		20	20	19	1	238	277	486	8			1,050.50
Gloucester, Mass.	236	2	18	20	19	1	206	216	315	35			1,013.76
Government Hospital for the Insane.	54	47	7	54	3	6	15,801						10,197.79
Grand Haven, Mich.	53	4	15	19	19		174	34	42	34			548.92
Green Bay, Wis.	57		10	10	10		175	47	56	1			510.65
Guilford, Miss.	44		6	6	6		80	38	83				708.45
Hartford, Conn.	10		10	10	9	1	174						174.00
Honolulu, Hawaii.	553	13	234	247	230	6	5,996	306	460	27	39	712	9,926.28
Honolulu, Wash.	58		25	25	23	1	546	33	66	4			1,402.23
Hingham, Va.	38		3	3	3		43	35	45				358.50
Jacksonville, Fla.	254	1	35	36	33	2	406	218	271	23			1,617.60
Juneau, Alaska.	123	1	24	25	25	1	413	98	161	23			1,626.00

Tort Huron, Mich.	70	15	5	5	4	1	1	119	65	116	83	66	1,023	514.50
Tortland, Oreg.	707	157	172	154	3	9	9	4,377	535	852	64	.....	.....	10,612.09
Portsmouth, N. H.	23	4	4	4	3	1	1	78	19	26	40	.....	.....	183.55
Port Tampa, Fla.	112	5	46	51	46	2	3	1,003	61	70	70	.....	.....	2,334.25
Providence, R. I.	284	7	123	130	118	5	7	2,645	154	199	60	.....	.....	4,731.52
Provincetown, Mass.	63	.....	.....	.....	.....	.....	.....	.....	63	78	58	.....	.....	240.65
Reedville, Va.	131	.....	.....	.....	.....	.....	.....	.....	131	179	.....	.....	.....	231.10
Richmond, Va.	33	1	1	1	1	.....	.....	11	32	80	.....	.....	.....	310.05
Rockland, Me.	241	.....	.....	.....	.....	.....	.....	.....	241	441	46	.....	.....	494.40
St. Paul, Minn.	11	3	3	3	3	.....	.....	18	8	10	.....	.....	.....	376.10
Saginaw, Mich.	64	5	5	5	5	.....	.....	69	59	81	4	.....	.....	371.22
Salem, Mass.	4	.....	.....	.....	.....	.....	.....	.....	4	4	.....	.....	.....	4.00
San Diego, Cal.	131	35	35	35	30	2	3	520	96	209	9	1	14	6,108.00
Sandusky, Ohio	50	6	6	6	5	1	1	88	44	67	.....	.....	.....	313.00
San Juan, P. R.	499	139	144	135	135	2	7	2,560	355	537	61	4	48	3,273.90
Sault Ste. Marie, Mich.	129	3	58	57	57	.....	1	773	71	77	45	.....	.....	1,300.02
Seattle, Wash.	2,306	10	381	391	368	2	21	5,086	1,915	3,194	423	14	203	13,239.43
Seboygan, Wis.	26	.....	.....	.....	.....	.....	1	99	21	29	2	.....	.....	417.90
Solomons, Md.	340	14	14	14	14	.....	.....	104	326	406	1	.....	.....	623.37
Superior, Wis.	211	4	58	62	61	1	.....	1,223	149	192	.....	.....	.....	2,324.48
Tacoma, Wash.	94	17	17	17	17	.....	.....	183	77	134	.....	.....	.....	1,177.25
Toledo, Ohio	414	3	84	87	84	.....	3	1,382	327	1,009	5	2	7	2,027.50
Unalaska, Alaska	125	2	12	14	12	.....	2	329	11	11	.....	.....	.....	768.00
Valdez, Alaska	139	1	14	15	13	2	.....	242	144	242	.....	.....	.....	1,698.20
Vicksburg, Miss.	199	1	80	81	78	2	1	691	118	185	4	.....	.....	1,685.62
Washington, D. C.	162	62	62	60	60	.....	2	582	100	163	22	.....	.....	2,518.83
Washington, N. C.	132	17	17	17	17	.....	.....	105	115	175	10	.....	.....	130.75
Quarantine Stations.	178	.....	.....	.....	.....	.....	.....	.....	178	289	11	.....	.....	.....
Coast Guard cutter Androscoggin.	351	6	6	6	6	.....	.....	26	345	584	2	.....	.....	1,996.76
<i>Trachoma hospitals.</i>														
Jackson, Ky.	420	17	403	420	411	.....	9	4,855	.....	.....	.....	.....	.....	.....
Hyden and London, Ky.	190	3	187	190	190	.....	.....	1,579	.....	.....	.....	.....	.....	.....
Hudman, Ky.	457	9	448	457	447	.....	10	3,850	.....	.....	.....	.....	.....	.....
<i>For special examination of members of the United States Coast Guard.</i>														
Accomac, Va.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Alpena, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amityville, N. Y.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31	.....	.....	.....
Cape Charles, Va.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	46	.....	.....	.....
Cheboygan, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23	.....	.....	.....
East Hampton, N. Y.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....
Grand Marais, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	58	.....	.....	.....
Hatteras, N. C.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nantuxet, Mass.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....
Orleans, Mass.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	45	.....	.....	.....
Oswego, N. Y.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20	.....	.....	.....

For special examination of members of the United States Coast Guard.

TABLE 3.—*Summary of physical examinations made by officers of the United States Public Health Service during the fiscal year ended June 30, 1915, exclusive of immigrants.*

Summary of examinations and rejections.	Total.	Pilots.	Merchant seamen.	United States Coast Guard.	Coast and Geodetic Survey.	Lighthouse Service.	Foreign seamen.	Immigration Service.	Civil Service Commission.	Isthmian Canal Commission.	Philippine Islands.	Public Health Service.	United States Navy.	United States Army.
Total number examined.....	7,357	3,618	1,096	2,228	93	36	5	67	191	3	12	1	2	5
Number passed.....	7,069	3,538	1,069	2,071	85	33	4	65	181	3	12	1	2	5
Number rejected.....	288	80	27	157	8	3	1	2	10					
<i>Causes of rejection, diseases, disability, etc.</i>														
Aliens deported, cause not stated..	2							2						
Abscess of elbow.....	1			1										
Arteriosclerosis, angina pectoris, and flat foot.....	1			1										
Bad teeth.....	6			6										
Bad teeth and under weight.....	1			1										
Bad teeth and chronic nasal catarrh.....	1			1										
Blind in one eye.....	1		1											
Bronchial rales.....	1							1						
Caries of bone, tibia.....	1						1							
Color blind.....	60	43	7	9	1									
Color blind and deafness.....	1			1										
Color blind and varicose veins.....	1			1										
Curvature of spine.....	1			1										
Defective vision.....	58	35	7	15					1					
Defective hearing.....	1			1										
Diabetes mellitis and defective vision.....	1			1										
Emphysema of lung, tachycardia, arteriosclerosis, nasal catarrh, and defective hearing.....	1		1											
Flat foot.....	2			2										
Flat foot and gonorrhea.....	1			1										
Flat foot and rheumatism.....	1			1										
Flat foot, varicocele, and deviation of the nasal septum.....	1			1										
Flat chest and under weight.....	1			1										
Fracture of the olecranon process.....	5	1		4										
General glandular enlargement.....	1			1										
Goiter.....	1			1										
Gonorrhea.....	4			4										
Gonorrhea and syphilis.....	1			1										
Heat prostration.....	1			1										
Heart disease, unclassified.....	1								1					
Hemorrhoids, internal.....	2			1		1								
Hemorrhoids and icterus of the conjunctiva.....	1				1									
Hemorrhoids and flat foot.....	1			1										
Hemorrhoids, external, and defective vision.....	1			1										
Hernia, inguinal.....	10		1	6	2	1								
Hernia, ventral.....	1			1										
Hernia and varicocele.....	1			1										
Hernia and varix of leg.....	1			1										
High temperature and pulse.....	1			1										
Hydrocele and varicocele.....	1			1										
Hypertrophy of heart.....	1			1										
Hypertrophy of tonsils.....	1			1										
Hypospadias and under weight.....	1			1										
Jaundice.....	1		1											
Knock-knee.....	1			1										
Loss of fingers.....	2			2										
Malarial fever.....	1		1											
Mental disability.....	1			1										
Missing teeth and enlarged turbinate bones.....	1		1											
Myalgia.....	1		1											
Myocarditis.....	1			1										
Nebula of both eyes.....	1			1										
Neurosis.....	1			1										
Nasal polypi.....	1			1										
Nephritis.....	1			1										
Neurasthenia.....	1			1										
Organic disease of the heart.....	1							1						
Over age limit.....	1							1						

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dispensary.
Total cases.....	1,098	14,341	7,025	6,236	562	459	1,157	40,343	55,781
General diseases.....	547	5,476	2,194	2,853	249	213	514	13,581	19,610
Smallpox.....		7	5	1	1			3	10
Cowpox.....								8	8
Chicken pox.....		6	6					1	7
Measles.....	2	20	22					3	25
Rubella.....		2	2					1	3
Scarlet fever.....		3	3						3
Influenza.....		360	292	64	1	1	2	870	1,230
Whooping cough.....								1	1
Mumps.....		22	19	2			1	23	45
Diphtheria.....		12	12					18	30
Simple continued fever.....	1	19	12	6			1	9	29
Enteric fever.....	28	333	276	46	1	12	26	28	389
Choleraic diarrhea.....		1				1		4	5
Dysentery.....	2	31	19	9	1	1	3	24	57
Yellow fever.....								4	4
Beriberi.....		6	2	4					6
Malarial fever:									
Intermittent.....	12	389	278	101	4		18	757	1,158
Remittent.....	2	77	48	28	2	1		204	283
Phagedena, sloughing.....		1	1					1	2
Erysipelas.....		22	19	1	2			21	43
Pyemia.....		1	1					6	7
Septicemia.....		11	2	5		3	1	7	18
Tubercle.....	291	547	21	331	98	129	259	309	1,153
Leprosy.....	3					1	2		3
Syphilis:									
Primary.....	2	103	4	92	7		2	217	322
Secondary.....	80	1,371	67	1,221	74	15	74	3,572	5,023
Tertiary.....	2	20	1	15	1	1	4	38	60
Gonorrhea.....	29	833	356	462	11		38	4,365	5,227
Diseases dependent on animal parasites:									
Tenia solium.....	1	11	10	2				9	21
Tenia mediocanellata.....	1	5	4	2					6
Tenia saginata.....								4	4
Tenia tonsurans.....		1	1					70	71
Tenia barbae.....								5	5
Tenia circinata.....								12	12
Ascaris lumbricoides.....		2		2					2
Oxyuris vermicularis.....								1	1
Pediculus pubis.....								5	5
Pediculus vestimentis.....		4		4				2	6
Phthirus inguinalis.....								7	7
Sarcoptes scabiei.....	1	26	16	9	1		1	201	228
Necator americanus.....	1	42	13	30					43
Diseases dependent on vegetable parasites: Trichophyton tonsurans.....		3	2				1	15	18
Effects of vegetable poisons:									
Opium.....		4		2	2			2	6
Tobacco.....								18	18
Poison ivy.....		8	5	3				20	28
Poison oak.....								2	2
Effects of inorganic poisons:									
Lead.....		1	1					2	3
Mercury.....		3	2	1				2	5
Iodine.....								2	2
Phenol.....								1	1
Effects of the presence of foreign bodies.....		9	6	3				49	58
Effects of mechanical injuries.....		2	2					5	7
Effects of heat.....		7	5	2				3	10
Effects of chemical agents.....		1	1					6	7
Effects of excessive exertions and strain.....		3	2	1				1	4
Pellagra.....	10	54	48	2	3		11	46	110
Scourvy.....		1	1						1
Alcoholism.....	5	180	116	53	9	4	3	166	351
Rheumatic fever.....	8	85	49	36	1	2	5	7	100

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dis- pen- sary.
Rheumatism.....	42	627	391	233	8	4	33	1,786	2,455
Gout.....								1	1
Osteoarthritis.....	4	4		2	1	1	4	3	11
Cyst:									
Mucous.....								4	4
Sebaceous.....	1	18	12	5	1	1		75	94
Ranula.....								1	1
New growth, nonmalignant:									
Lipoma.....	1	13	9	4			1	17	31
Fibroma.....	2	4	2	1	1	1	1	11	17
Chondroma.....		2		2					2
Osteoma.....		1			1				1
Condyloma.....		2	1	1				11	13
Papilloma.....	1	18	8	10			1	67	86
Adenoma.....								2	2
Pterygium.....		1	1					4	5
New growth, malignant:									
Sarcoma.....	1	9	1	3	2	3	1	2	12
Carcinoma.....	2	30	3	7	7	13	2	9	41
Squamous carcinoma.....	1	16	2	4	2	5	4	11	28
Rodent ulcer.....								1	1
Leucocythemia.....	1	3		1	1	2			4
Anemia.....		4		3			1	24	28
Idiopathic anemia.....	2	8		8		2		3	13
Purpura.....		3	2	1				3	6
Diabetes mellitus.....	2	19	2	11	1	5	2	75	96
Diabetes insipidus.....								8	8
Hemophilia.....								1	1
Congenital malformations.....	1	3	2	2				3	7
Debility.....	4	40	10	21	4	4	5	300	344
Old age.....	1	2		1	1	1		2	5
LOCAL DISEASES.									
DISEASES OF THE NERVOUS SYSTEM.	151	396	98	219	43	31	156	1,166	1,712
Of the nerves—									
Inflammation—									
Neuritis.....	4	44	13	30	1		4	161	209
Multiple neuritis.....		10	4	5			1	7	17
Of the spinal cord and mem- branes—Cord—									
Inflammation—									
Diffuse.....		7	1	2		3	1	1	8
Local.....		2		2					2
Hemorrhage.....		1		1					1
Degeneration—									
Of anterior cornua.....	1	1			1		1		2
Of lateral columns.....	1	3		2	1		1	2	6
Of posterior columns.....	30	17	2	9	7	1	29	20	67
Of lateral and posterior columns.....	1						1		1
Of the brain and its mem- branes—Membranes—									
Inflammation of pia mater and arachnoid.....		2					2		2
Of the brain and its mem- branes—Brain—									
Sclerosis.....		2		1	1			1	3
Softening.....		1			1				1
Hemorrhage.....	2	5		2		1	4	6	13
Hyperemia.....		2	1	1					2
Anemia of brain.....								2	2
Functional nervous disorders with other diseases of unde- termined nature—									
Apoplexy.....	2	9		4		7		3	14
Paralysis—									
Paraplegia.....	5	4		3	1	1	3		9
Hemiplegia.....	29	40	1	26	5	7	30	17	86
Monoplegia.....		1	1					1	2
Local paralysis.....		5	1	2	1		1	18	23
Somnambulism.....	2							1	1
Incomplete paralysis.....		2		1			3		5
Paralysis agitans.....	1	1		1	1			1	3

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dispen- sary.
DISEASES OF THE NERVOUS SYSTEM—Continued.									
Functional disorders with other diseases of undeter- mined nature—Continued.									
Spasm.....	1	4	3	1			1	7	12
Torticollis.....		4	3	1				11	15
Occupational neurosis.....		1	1						1
Epilepsy.....	4	25	4	19	2	1	3	46	75
Vertigo.....		6	3	3				14	20
Headache.....		7	5	2				119	126
Hyperesthesia.....								6	6
Anesthesia.....		2		1					2
Neuralgia.....	3	65	38	25	1		4	357	425
Hysteria.....		9	1	8				1	10
Nervous weakness.....	3	63	11	45	7		3	350	416
Aphasia.....		2		1			1		2
Hiccough.....								2	2
Mental diseases—									
Epilepsy.....	2		1				1		2
Mania.....	6	4		3	2	2	3	1	11
Melancholia.....	3	12		9	1		5	9	24
Dementia, post apoplectic.....	2						2		2
Dementia præcox.....	25	4	1			4	24		29
Dementia, traumatic.....	2			1			1		2
Dementia, unclassified.....	4	17	1	3	6	3	8	1	22
Mental stupor.....		4		2	1		1		4
General paralysis of the insane.....	6	1		1	1		5		7
Delusional insanity.....	4	6	1	2	2		5		10
Syphilis, cerebral.....	2					1	1		2
Phychosis, maniac depres- sive.....	6	1					7		6
DISEASES OF THE EYE.....	8	114	42	61	12	1	6	1,982	2,104
Conjunctivitis—									
Catarrhal—									
Acute.....	1	26	21	6				1,028	1,055
Chronic.....		4	2	2				27	31
Echymosis of conjunctiva.....								2	2
Degeneration of conjunctiva.....		1		1					1
Keratitis.....		6		5			1	4	10
Ulceration of cornea.....		15	6	5	1		3	18	33
Ulceration of cornea from tra- choma.....		1		1				93	94
Opacity of cornea.....		1		1				1	2
Acquired deformities of cornea.....								1	1
Opacity of cornea from tra- choma.....								339	339
Staphyloma.....								1	1
Scleritis.....								2	2
Trichiasis.....								124	124
Iritis.....	2	24	8	18				42	68
Congestion of eye.....								2	2
Choroiditis.....								1	1
Glaucoma.....	1	2	1	1	1	1		14	17
Optic neuritis.....		2		1	1				2
Atrophy and degeneration of optic nerve or papilla.....		2				1			2
Retinitis.....	1						1	1	2
Lenticular cataract.....	2	4	1	2	3			16	22
Shrunken eyeball.....		1			1				1
Multiple chancroid.....		1	1						1
Panophthalmitis.....		1	1						1
Ametropia, hypermetropia.....	1					1		3	4
Neuralgia of eyeball.....								2	2
Congenital color blindness.....								2	2
Presbyopia.....								3	3
Asthenopia.....								1	1
Squint.....								3	3
Diplopia.....		1			1			2	3
Abscess of lacrymal sac.....								1	1
Dacryocystitis.....		2	1	1				4	6

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dis- pen- sary.
DISEASES OF THE EYE—Contd.									
Obstruction of nasal duct.....		3		3				3	6
Blepharitis marginalis.....		2		2				15	17
Sty.....		6		6				40	46
Abscess of eyelid.....		7		5	2			2	9
Echymosis of eyelid.....		1		1				6	7
Edema of eyelids.....		1		1				2	3
Exophthalmos.....								1	1
Inflammation of lacrymal gland.....								2	2
Ectropion.....								1	1
Entropion.....								173	173
DISEASES OF THE EAR	1	70	27	41	1		2	354	425
Inflammation of the external meatus—									
Acute.....		6	2	4				36	42
Chronic.....		1		1				3	4
Abscess.....		4	2	1			1	12	16
Accumulation in external meatus of wax or epidermis.....	1	3	3	1				109	113
Inflammation of the middle ear—									
Nonsuppurative.....		20	6	14				85	105
Suppurative.....		30	13	16			1	68	98
Within the mastoid cells.....		1	1					1	2
Ulceration of membrana tym- pani.....								1	1
Perforation of membrana tym- pani.....		1		1				6	7
Necrosis of ossicles.....								2	2
Anchyllosis of ossicles.....								1	1
Obstruction of Eustachian tube.....								7	7
Tinnitus.....		1			1			2	3
Deafness.....								20	20
Necrosis, internal ear.....		3		3				1	4
DISEASES OF THE NOSE	5	62	45	20	1		1	471	538
Inflammation of soft parts.....	3	21	14	9			1	411	435
Diseases of septum—									
Hæmatoma.....		1	1						1
Abscess.....		1		1				4	5
Deviations.....	1	16	11	5	1			9	26
Epistaxis.....		4	3	1				11	15
Inflammation of the accessory sinuses.....	1	5	3	3				13	19
Inflammation of the naso- pharynx.....		14	13	1				23	37
DISEASES OF THE CIRCULATORY SYSTEM	40	379	72	206	27	64	50	517	937
Pericarditis.....		2		1		1		13	15
Endocarditis.....	1	7	1	2		1	4	2	11
Valvular disease—									
Aortic.....	5	52		28	4	13	12	36	93
Mitral.....	17	123	3	87	10	26	14	165	305
Aortic and mitral.....	5	37		22	3	13	4	28	70
Myocarditic.....	1	10	1	6		3	1	27	38
Degeneration of the heart—									
Fatty.....		1		1				7	8
Fibrous.....		1		1				3	4
Aneurysm, traumatic.....		1					1		2
Hypertrophy of heart.....		2		2				2	4
Dilatation of heart.....	1	9	2	5		2	1	8	18
Angina pectoris.....		3		2			1	5	8
Disordered action of the heart—									
Abnormal slowness.....								1	1
Abnormal rapidity.....		2		2				30	32
Irregularity.....	1	8	2	5			2	29	38
Arteritis.....		4		2	1		1	5	9

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dispen- sary.
DISEASES OF THE CIRCULATORY SYSTEM—Continued.									
Degeneration of arteries—Ar- terio-capillary fibrosis.....	3	8	1	5	1	1	3	20	31
Aneurysm of arteries.....		10	1	3	1	4	1	4	14
Obstruction of arteries—Em- bolism.....	1	1		2					2
Phlebitis.....	1	4	2	1			2	9	14
Varyx.....	4	89	57	27	6		3	98	191
Varicose aneurysm.....								5	5
Naevus.....								1	1
Obstruction of veins.....		1		1				14	15
Thrombosis of veins.....		4	2	1	1			4	8
DISEASES OF THE RESPIRATORY SYSTEM.									
Hay fever.....	34	806	448	279	21	56	36	2,509	3,349
Trachertis.....		2		2				20	22
Inflammation of mucous mem- brane of larynx—		1	1					3	4
Catarrhal, acute.....		20	5	14			1	102	122
Catarrhal, chronic.....		9	2	6	1			22	31
Membranous.....								7	7
Bronchitis—									
Catarrhal, acute.....	5	262	179	77	5	1	5	1,927	2,194
Catarrhal, chronic.....	9	78	12	64	7		4	176	263
Spasmodic asthma.....	2	40	5	30	1	1	5	61	103
Congestion of lung.....		4	2	1		1		13	17
Hemorrhage of lung—Hemop- tysis.....		2	1	1				4	6
Pneumonia.....	2	225	153	22		44	8	16	243
Broncho-pneumonia.....	3	9	8	3		1			12
Chronic interstitial inflamma- tion.....		1		1					1
Phthisis—									
Acute.....		5		5				20	25
Chronic.....		10	1	4	2	2	1	5	15
Tubercular.....	1	4		2	3			4	9
Pleurisy—									
Acute.....	8	109	71	36			10	98	215
Chronic.....		18	4	7	2	4	1	27	45
Empyema.....	2	2	2			1	1	4	8
Hydrothorax.....	1			1					1
Emphysema, vesicular.....	1	5	2	3		1			6
DISEASES OF THE DIGESTIVE SYSTEM									
Inflammation of the lips.....	70	1,911	1,308	484	70	36	84	6,081	8,062
Ulceration of the lips.....								14	14
Inflammation of the mouth.....		3	2				1	4	4
Ulceration of the mouth.....		1		1				46	49
Inflammation of gums.....								11	12
Inflammation of the dental pulp.....								6	6
Suppuration of the dental pulp.....								4	4
Caries of dentine and cementum.....		1		1				5	5
Necrosis of cementum.....								113	114
Inflammation of dental peri- osteum.....		2	2					1	1
Abscess of dental periosteum.....		8	6	2				7	9
Inflammation of gums and alveoli.....		2		2				51	59
Suppuration of alveoli.....	1	15	8	5			3	5	7
Ulceration of gums and alveoli.....		1			1			44	60
Caries of the alveoli.....		2		2				9	10
Toothache.....		1			1			9	11
Inflammation of the tongue.....		1	1					49	50
Ulceration of the tongue.....		1	1					1	2
Sore throat.....	1	19	12	6	2			5	6
Inflammation of tonsils—								194	214
Follicular.....	2	273	207	49	3		16	663	938
Suppuration.....		28	20	7			1	48	76

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dis- pen- sary.
DISEASES OF THE DIGESTIVE SYSTEM—Continued.									
Hyperthrophy of tonsils.....	2	21	17	5		1		25	48
Elongated uvula.....								3	3
Inflammation of salivary glands.....		1	1					1	2
Salivation.....								1	1
Inflammation of the Pharynx—									
Catarrhal.....	2	25	18	9				163	190
Granular.....		1		1				6	7
Follicular.....		4	4					26	30
Post-pharyngeal abscess.....								1	1
Ulceration of pharynx.....		3	2	1				5	8
Gastric fistula.....		1		1					1
Inflammation of hernial sac.....		2	1	1					2
Inflammation of the stomach—									
Catarrhal.....	8	198	114	75	4	4	9	344	550
Phlegmonous or suppurative.....								2	2
Membranous or pellicular.....								1	1
Ulceration of the stomach—									
Superficial.....	3	21	7	13	3	1		28	52
Perforating.....		1	1					2	3
Hemorrhage of the stomach.....		2		1	1				2
Dilatation of the stomach.....	1	3		2	1		1	3	7
Indigestion.....	1	87	51	34		1	2	1,329	1,417
Hyperemia of stomach.....		1	1						1
Intestinal contraction.....		1	1						1
Vomiting.....								2	2
Gastralgia.....		4		4				10	14
Heartburn.....								2	2
Loss of appetite.....								34	34
Fistula of intestines.....	1		1						1
Inflammation of the intes- tines—									
Enteritis.....	1	33	29	3		1	1	144	178
Appendicitis.....	6	156	113	31	1	9	8	88	250
Colitis.....	2	21	15	5	2		1	20	43
Catarrhal.....	1	27	20	6		2		18	46
Ulceration of the intestines.....	1	5	2	4				7	13
Displacement of stomach.....		2		1	1				2
Fecal accumulation.....		19	15	4				11	30
Hernia.....	15	412	340	38	29	3	17	459	886
Obstruction of the intestines.....		4	2			1	1		4
Intestinal dyspepsia.....		2	2					14	16
Constipation.....		87	56	27	1		3	1,227	1,314
Colic.....		20	19	1				43	63
Diarrhea.....	4	43	29	10	5	1	2	289	336
Enteralgia.....		1	1					1	2
Inflammation of the rectum.....	1	1		2				3	5
Periproctitis, abscess.....		24	9	15				11	35
Fissure of the anus.....		8	2	5	1			8	16
Fistula in ano.....	6	56	35	20	3		4	46	108
Prolapse of the rectum.....		3		3				5	8
Ulceration of rectum.....		3		2	1			2	5
Piles—									
Internal.....	1	34	20	15				68	103
External.....	1	41	29	11	2		1	137	179
Mixed.....	1	54	38	13	1		3	17	72
Pruritus ani.....								15	15
Inflammation of the liver—									
Acute.....		8	1	5			2	21	29
Acute suppuration.....		1				1			1
Acute abscess.....	1	7	1	3	1	3		3	11
Chronic.....	4	8		8		2	2	10	22
Hyperemia of the liver.....		12	10	2				48	60
Hypertrophy of the liver.....		1		1					1
Jaundice.....		20	10	7	2		1	31	51
Inflammation of hepatic ducts and gall bladder.....	2	38	21	14	2	1	2	19	59
Calculi.....		6	3	2			1	16	22
Biliary colic.....		5	5					6	11

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hospi- tal from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hospi- tal and dispen- sary.
DISEASES OF THE DIGESTIVE SYSTEM—Continued.									
Inflammation of the perito- neum.....		8	3	1		3	1	1	9
Dropsy.....	1	4		3	1	1		1	6
Inflammation of pancreas.....		1				1			1
Accumulation of bile or mucus.....								11	11
Stricture of rectum.....		2			1		1	4	6
DISEASES OF THE LYMPHATIC SYSTEM.....	16	457	250	165	40		18	407	880
Abscess of spleen.....		1	1						1
Congestion of spleen.....								1	1
Inflammation of lymph glands, suppuration.....	16	450	246	162	40		18	394	860
Hypertrophy of lymph glands.....								9	9
Inflammation of lymphatics, suppuration.....		5	3	2				3	8
Obliteration of lymphatics.....		1		1					1
DISEASES OF THE THYROID BODY.....		3		2		1		12	15
Inflammation.....		1		1					1
Goiter.....		2		1		1		12	14
DISEASES OF THE SUPRARENAL CAPSULES.....		1		1					1
Addison's disease.....		1		1					1
DISEASES OF THE URINARY SYSTEM.....	19	309	35	228	6	29	30	552	880
Acute nephritis.....	4	36	6	22	1	6	5	28	68
Bright's disease—									
Chronic nephritis.....	13	195	10	162	2	19	15	133	341
Granular kidney.....		9	1	2	1	3	2	19	28
Hydronephrosis.....		1					1		1
Pyelitis.....		2	2					4	6
Abscess of kidney.....		1					1		1
Congestion of kidney.....								1	1
Calculus in kidney.....		4		2	1		1	6	10
Calculus in ureter.....	1	2	1	2				5	8
Suppression of urine.....		2	1	1			1	1	3
Hematuria.....		4		3			1	8	12
Albuminuria.....								4	4
Lithuria.....								3	3
Phosphaturia.....		1		1				1	2
Nephralgia.....								2	2
Inflammation of bladder—									
Acute.....	1	28	7	20	1		1	150	179
Subacute.....		2		2				41	43
Chronic.....		10	1	7		1	1	49	59
Calculus of bladder.....		3	2				1		3
Distention of bladder.....		3	3						3
Irritability of bladder.....		2	1				1	67	69
Retention of urine.....		3		3				8	11
Incontinence of urine.....		1		1				22	23
DISEASES OF THE GENERATIVE SYSTEM.....	39	894	475	374	25	3	55	1,891	2,824
Urethritis.....		8	2	5	1			83	91
Gleet.....		1			1			61	62
Abscess of the urethra.....	1	4	2	2			1	2	7
Ulcer of the urethra.....		2	2					1	3
Hemorrhage of the urethra.....								2	2
Stricture of urethra—									
Organic.....	6	97	23	68	6		6	237	340
Traumatic.....		4		3			1	2	6
Spasmodic.....	1	2		3				4	7
Abscess of prostate.....		2		2					2
Urethral fistula.....	1	5		3			3	7	13

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary.	Total treated in hos- pital and dispen- sary.
DISEASES OF THE GENERATIVE SYSTEM—Continued.									
Soft chancre of scrotum.....								26	26
Extravasation of urine.....		3			1	1	1	1	4
Inflammation of the prostate—									
Acute.....		4	3		1			8	12
Chronic.....		9		7			2	3	12
Prostatarrhea.....								4	4
Hypertrophy of the prostate.....		17	2	12	1		2	43	60
Posthitis.....		1	1					11	12
Phimosis.....	2	75	59	15	2		1	50	127
Paraphimosis.....	2	10	5	7				7	19
Inflammation of the glans penis.....		11	8	3				60	71
Abscess of penis.....		2	1	1				1	3
Ulcer of penis.....	3	91	40	48	1		5	253	347
Edema of penis.....								4	4
Soft chancre.....	12	298	142	139	8	1	20	643	953
Priapism.....								1	1
Inflammation of the scrotum.....								2	2
Abscess of the scrotum.....		7	2	5				2	9
Pruritus of the scrotum.....								13	13
Chordee.....								2	2
Hypertrophy of prepuce.....		13	13					2	15
Inflammation of the spermatic cord.....								6	6
Hydrocele of the spermatic cord.....		18	8	8			2	13	31
Hematocele of the spermatic cord.....	2		1	1					2
Varicocele.....	1	52	49	2	1		1	98	151
Hydrocele of tunica vaginalis.....		35	23	6	1	1	4	31	66
Inflammation of the testicle—									
Acute orchitis.....	5	39	30	12			2	93	137
Chronic orchitis.....		25	18	7				7	32
Epididymitis.....	3	48	37	11			3	48	99
Abscess of testicle.....		1			1			2	3
Spermatorrhea.....								33	33
Impotence.....		1	1					15	16
Sloughing of scrotum.....		1					1		1
Inflammation of the ovary.....								1	1
Inflammation of the fallopian tube.....		2	1	1				2	4
Inflammation of the uterus.....		1		1					1
Displacements and distortions of the uterus.....		1		1					1
Inflammation of the vagina.....		2	1	1					2
Inflammation of the mammary glands.....								3	3
Amenorrhea.....								1	1
Menorrhagia.....								2	2
Metrorrhagia.....		1	1						1
Leucorrhea.....		1			1			1	2
DISEASES OF THE ORGANS OF LOCOMOTION.	23	406	206	181	15	2	25	1,488	1,917
Inflammation of the bones—									
Osteitis.....	3	27	9	16	3		2	24	54
Periostitis.....		9	3	6				12	21
Caries.....		5	4	1					5
Necrosis.....	2	20	9	9	1		3	14	36
Ununited fracture or false joint.....		2		2					2
Inflammation of joints—									
Acute synovitis.....	4	55	19	29	4	1	6	55	114
Chronic synovitis.....		7	1	3	2		1	13	20
Suppuration.....								5	5
Abscess of jaw.....		3		3				1	4
Ankylosis.....	1	3	2	1			1	4	8
Dislocation of articular cartilage.....		1	1					4	5
Flat foot.....	2	9	2	8			1	32	43
Dislocation of joint.....		2	1		1			6	8
Atrophy of muscles.....		3	1	1			1	3	6
Inflammation of spine.....		1		1					1
Psoas, lumbar, and other abscesses.....	1					1			1

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary mmmm	Total treated in hos- pital and dispen- sary.
DISEASES OF THE ORGANS OF LOCOMOTION—Continued.									
Posterior curvature of spine....		2	.....	1			1	1	3
Lateral curvature of spine.....	2	2		2	1		1	3	7
Inflammation of muscles.....		3	2	1				11	14
Suppuration of muscles.....		4	2				2	7	11
Myalgia.....									
Lumbago.....	4	192	117	75			4	1,174	1,370
Stiff neck.....								5	5
Inflammation of fasciæ.....								1	1
Gangrene.....		1	1						1
Inflammation of tendons.....		4	1	3				4	8
Contraction of tendons.....								2	2
Rupture of tendons.....		1	1					1	2
Inflammation of sheaths of tendons.....	1	3	1	3				19	23
Thecal abscess.....		1	1					4	5
Ganglion.....	1	2	3					6	9
Ankylosis of spine.....		1			1				1
Inflammation of bursæ—									
Acute.....		23	15	6	1		1	32	55
Chronic.....	1	10	3	7	1			19	30
Abscess of bursæ.....		2	2					8	10
Bunion.....	1	2	1	1			1	9	12
Bursal cyst.....		3	2	1				4	7
Bursal tumor.....								1	1
Hallux valgus.....		2	1	1					2
Hammer toe.....		1	1					4	5
DISEASES OF THE CONNECTIVE TISSUE.....									
	21	366	222	130	6	1	28	1,156	1,543
Inflammation.....	8	174	109	59	3		11	688	870
Abscess.....	12	184	112	65	3		16	437	633
Gangrene.....	1	1				1	1	8	10
Edema.....		1		1				17	18
Elephantiasis.....		1		1				1	1
Undue formation of fat.....		4		4				9	9
Hemorrhage.....		1	1					5	9
DISEASES OF THE SKIN.....									
	13	420	229	173	5	1	25	2,256	2,689
Erythema.....		2	2					21	23
Pityriasis rosea.....								1	1
Urticaria.....		14	12	2				76	90
Prickly heat.....								17	17
Eczema.....		39	13	25			1	370	409
Impetigo.....		3	1	2				12	15
Pityriasis rubra.....		2	1	1				5	7
Prurigo.....								4	4
Lichen.....								1	1
Psoriasis.....	1	7	1	6			1	46	54
Herpes.....		10	8	2				101	111
Zona.....		10	4	4			2	60	70
Pemphigus.....								2	2
Dermatitis herpetiformis.....		6	5				1	29	35
Acne.....		4	1	2			1	125	129
Gutta rosea.....								1	1
Sycosis.....		2	2					18	20
Seborrhœa.....								6	6
Sudamina.....								1	1
Acra.....								1	1
Ulcer.....	11	167	81	76	2		19	435	613
Clethræ.....		1	1					2	3
Boil.....	1	79	54	25	1			662	742
Carbuncle.....		41	24	16		1		87	128
Whitlow.....		9	6	1	2			49	58
Onychia.....		12	7	5				31	43
Corn.....		3	2	1				18	21
Tylosis.....		3		3				4	7
Cheloid.....		1	1					1	2
Wen.....		4	3	1				29	33

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary	Total treated in hos- pital and dispen- sary.
DISEASES OF THE SKIN—Cont'd.									
Hyperidrosis.....								5	5
Pruritus.....								28	28
Lupus.....								2	2
Aleppo boil.....		1		1					1
Adenoma sebaceum.....								1	1
Bromidrosis.....								4	4
Anidrosis.....								1	1
Injuries.									
GENERAL INJURIES.....	8	89	70	23		1	3	212	309
Effects of heat—									
Burns and scalds.....	2	48	34	15			1	158	208
Heat stroke.....	3	16	17	1		1		9	28
Sunstroke.....								4	4
Effects of cold.....		6	6					7	13
Effects of chemical irritants and corrosives.....								1	1
Multiple injury.....	3	8	3	7			1	30	41
Exhaustion.....		9	9					1	10
Shock.....		2	1				1	2	4
LOCAL INJURIES.....	103	2,182	1,304	796	34	18	133	5,708	7,993
Contusion of nerves.....		1	1					2	3
Compression of nerves.....		1					1		1
Rupture of arteries.....								1	1
Wound of arteries, punctured.....		8	6	2				3	3
Contusion of muscles.....		16	8	6			2	9	17
Strain of muscles.....		1	1					140	156
Rupture of muscles.....		4	4					3	4
Strain of tendons.....		3	1	2				6	10
Rupture of tendons.....		3	3					2	5
Wound of tendons.....		3	3					1	4
Wound of muscle, lacerated.....		7	1	6				4	3
Contusion of skin.....		4	2	2				7	14
Abrasion of skin.....		10	9	1				104	108
Wound of skin.....		89	53	29		4	6	136	146
Burn or scald of skin.....	3	20	17	2			1	238	330
Frostbite.....								13	33
Effects on the skin of irritants or corrosives.....	1			1				7	8
Abrasion of mucous membrane.....		1	1					3	4
Wound of mucous membrane.....								2	2
Burn or scald of mucous mem- brane.....		3	3					4	7
Contusion of scalp.....		3	3					15	18
Wound of scalp.....	1	65	38	25			3	343	409
Contusion of skull.....		5	1	4				9	14
Fracture of the vault of skull.....		1	1						1
Fracture of the base of skull.....		3		1		2		1	4
Wound of skull.....		1		1				2	3
Concussion of brain.....		10	4	5		1		1	11
Contusion of brain.....		1	1						1
Compression of brain.....		1	1			1			1
Contusion of face.....		23	15	8				44	67
Wound of face and mouth.....		49	30	19				144	193
Fracture of facial bones.....		24	9	15	1		1	10	36
Dislocation of nasal cartilages.....		1	1						1
Injuries of alveoli and teeth.....								1	1
Dislocation of lower jaw.....		1	1						1
Burn or scald of mouth.....		1	1						1
Contusion of eyelid.....		8	6	2				11	19
Wound of eyelid.....		4	2	2				18	22
Subconjunctival hemorrhage.....		1		1					1
Wound of conjunctiva.....								4	4
Contusion of eyeball.....	1	6	5	2				12	19
Foreign body in eyeball.....		1			1			7	8
Foreign bodies in the conjunc- tiva or cornea.....		10	9	1				118	12

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hos- pital at close of year.	Treated at dis- pen- sary	Total treated in hos- pital and dis- pen- sary.
LOCAL INJURIES—Continued.									
Wound of eyeball.....		4	2	1			1	9	13
Contusion of pinna.....								3	3
Hematoma of pinna.....								1	1
Wound of pinna.....	1		1					3	4
Foreign body in external meatus.....								9	9
Gunshot wound.....	1	6	3	3	1			5	12
Contusion of neck.....		1	1					3	4
Wound of neck.....		7	4	3				7	14
Fracture of spine with displace- ment.....	2	1				1	2		3
Contusion of chest.....	1	52	29	21			3	145	198
Dislocation of costal cartillages.....		1		1				5	6
Fracture of ribs.....	4	89	51	36		1	5	98	191
Fracture of sternum.....								1	1
Wound of parietes of chest.....		5	4	1				11	16
Contusion of back.....		69	47	14			8	107	176
Sprain of back.....		34	20	14				59	93
Wound of back.....		10	3	6	1			18	28
Fracture of spine.....		7		4			3	1	8
Concussion of cord.....		2	1	1				3	5
Contusion of abdomen.....		7	4	2	1			23	30
Wound of parietes of abdomen.....		5	2	2		1		20	25
Contusion of the pelvis.....		4	1	2	1			7	11
Contusion of the perineum, scrotum, or penis.....		5	4	1				2	7
Wound of the male urethra, perineum, scrotum, testis, or penis.....		13	12	1				25	38
Wound of rectum.....		3	1	1		1		1	4
Rupture of urethra.....		1	1					3	4
Fracture or dislocation of pelvic bones.....		2	1			1		1	3
Fracture of coccy.....		1	1					3	4
Fracture of vertebra.....		1		1			1		1
Contusion of testicle.....		2		1	1		1	12	14
Contusion of upper extremities.....	4	114	59	56			3	458	576
Sprain of shoulder.....	1	5	5	1				18	24
Sprain of elbow.....		3	3					18	21
Sprain of wrist.....	2	22	16	5	3			149	173
Sprain of hand.....		1	1	1				16	17
Sprain of thumb.....		2	2					8	10
Sprain of fingers.....								13	13
Wound of upper extremities.....	10	262	160	97	3		12	1,654	1,926
Wound of joint, upper extremi- ties.....		2	1	1				4	6
Fracture of clavicle.....	2	21	8	11	1		3	7	30
Fracture of scapula.....		2		2				1	3
Fracture of humerus.....		15	8	4	2	1		3	18
Fracture of bones of forearm— Radius.....	2	42	21	16	2		5	38	82
Ulna.....	1	16	9	5	1		2	8	25
Both bones.....	4	12	9	5			2	4	20
Fracture of carpus, metacarpus, or phalanges.....		41	21	16			4	59	100
Dislocation of clavicle.....		14	6	7			1	5	19
Dislocation of humerus.....	2	12	8	6				11	25
Dislocation of radius and ulna.....		8	4	3			1		8
Dislocation of phalanges of thumb.....		2	1				1	8	10
Dislocation of phalanges of fingers.....								4	4
Injuries of bursa.....		2		2				3	5
Contusion of lower extremities.....	6	265	158	101			12	413	684
Sprain of hip.....		3	2		1			3	6
Sprain of knee.....	1	9	7	2	1			44	54
Sprain of ankle.....	5	149	94	52	1		7	167	321
Sprain of foot.....	1						1	19	20
Internal derangement of joints.....		2	1	1				7	9
Wound of lower extremities.....	11	189	127	62	2	1	8	462	662
Wound of joint, lower extremi- ties.....		11	7	3			1	6	17

TABLE 4.—*Tabular statement of diseases and injuries treated during the fiscal year ended June 30, 1915—Continued.*

Diseases.	Re- main- ing in hos- pital from pre- vious year.	Ad- mitted during the year.	Re- cov- ered.	Im- proved.	Not im- proved.	Died.	Re- main- ing in hospital at close of year.	Treated at dis- pen- sary	Total treated in hos- pital and dis- pensary.
LOCAL INJURIES—Continued.									
Fracture of femur.....	8	24	13	7	1	1	10	8	40
Fracture of cervix femoris.....		1		1					1
Fracture of patella.....		11	5	5			1	1	12
Fracture of tibia.....	6	40	30	10	1	1	4	8	54
Fracture of fibula.....	4	56	30	21	2		7	11	71
Fracture of tibia and fibula.....	10	33	23	14		1	5	16	59
Fracture of bones of foot—									
Of the tarsus.....		3	3					6	9
Of the metatarsus.....	2	23	7	14			4	10	35
Of the phalanges of the toes.....	4	15	9	7	3			6	25
Dislocation of femur.....		1		1					2
Dislocation of patella.....		1		1				1	1
Dislocation of tibia.....		2	1	1					2
Dislocation of foot.....		3	1	1			1		3
Dislocation of metatarsus and phalanges.....		2	1	1				1	3
Malinger.....		15	10	1	4			24	39
Auto-intoxication.....		1	1						1

TABLE 5.—*Comparative exhibit—Ratio of deaths from specific causes, 1906 to 1915.*

Deaths from—	Gen- eral aver- age.	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915
General diseases.....	48.71	51.52	52.17	44.92	50.00	49.03	41.90	50.80	51.89	48.24	46.65
Diseases of the—											
Nervous system.....	6.04	4.87	6.72	5.06	6.51	3.87	5.18	8.50	6.75	6.39	6.78
Circulatory system.....	12.14	11.16	10.47	12.06	8.74	13.39	15.12	11.04	10.81	14.53	14.05
Respiratory system.....	11.41	9.13	11.06	13.42	9.87	13.60	14.90	10.35	10.27	9.25	12.26
Digestive system.....	6.37	5.88	5.34	4.67	10.08	7.13	5.83	6.44	5.13	5.28	7.89
Genito-urinary sys- tem.....	7.17	6.09	5.54	10.13	7.85	4.97	8.86	7.59	5.94	7.93	6.79
Injuries.....	6.47	9.13	7.12	7.20	5.61	7.34	6.26	4.37	8.01	5.52	4.16
From all other causes.....	1.69	2.22	1.58	2.54	1.34	.87	1.95	.91	1.20	2.86	1.42

TABLE 6.—*Surgical operations performed during the fiscal year 1915.*

Operations.		Operations.	
Total number of operations.....	6,712	Operations on cysts:	
Postoperative mortality.....	31	Removal of—	
Operations on tumors:		Dermoid.....	2
Removal by excision—		Ganglion.....	4
Carcinoma.....	6	Mucous cyst.....	1
Condyloma.....	4	Sebaceous cysts.....	21
Chondroma.....	1	Unclassified.....	2
Hematoma.....	1	Free incision with curettage—	
Hypernephroma.....	2	Dermoid.....	1
Keloid.....	2	Sebaceous cysts.....	3
Lipoma.....	14		34
Myxosarcoma.....	2		
Papilloma.....	6	Evacuation of abscess:	
Sarcoma.....	1	By free incision and drainage—	
Squamous carcinoma.....	5	Alveola.....	3
Unclassified.....	15	Axilla.....	11
	59	Arm.....	6
		Abdomen.....	1
		Buttock.....	3
		Back.....	7

TABLE 6.—Surgical operations performed during the fiscal year 1915—Contd.

Operations.		Operations.	
Evacuation of abscess—Continued.		Operations on the lymphatic organs—	
By free incision and drainage—Con.		Continued.	
Cheek.....	1	Excision and drainage—	
Chest.....	2	Axillary glands.....	1
Ear.....	2	Bubo.....	62
Elbow.....	1	Cervical glands.....	3
Finger.....	5	Tuberculosis of lymph glands of	
Foot.....	4	neck.....	2
Face.....	2	Incision and curettage—	
Hand.....	14	Axillary glands.....	1
Ischiorectal.....	13	Bubo.....	6
Inferior maxilla.....	4	Cervical glands.....	1
Knee.....	1		188
Leg.....	6		
Mouth.....	1		
Neck.....	12	Operations on nerves:	
Peridental.....	1	Excision for compression.....	1
Prostate.....	2	Injection of 80 per cent alcohol for	
Patella.....	1	tuberculosis of larynx.....	3
Periproctitis.....	2		4
Periurethral.....	4		
Scrotum.....	4	Operations on the skin and subcutaneous	
Subdiaphragmatic.....	1	tissues:	
Thigh.....	7	Incisions and drainage for—	
Urethra.....	2	Cellulitis.....	2
Wrist.....	1	Inflammation.....	42
Unclassified.....	12	Septicemia.....	2
By incision and curettage—		Ulcer of skin.....	1
Elbow.....	1	Incision and packing for inflamma-	
Finger.....	3	tion.....	6
Hand.....	3	Incision and curettage for—	
Rectum.....	1	Inflammation.....	1
Thigh.....	1	Infected wound of upper extrem-	
Unclassified.....	3	ity.....	6
By incision and packing—Neck.....	1	Infected wound of lower extrem-	
By incision with subsequent clo-		ity.....	1
sure—Neck.....	1	Ulcer of skin.....	2
By aspiration—		Incision for inflammation.....	5
Knee.....	1	Excision for—	
Thigh.....	1	Bunion.....	2
	152	Cicatrix of skin.....	2
Removal of foreign bodies:		Onchia.....	11
From—		Suture and dressing for wound of—	
Hand.....	4	Finger.....	6
Foot.....	1	Hand.....	5
Finger.....	2	Toe.....	1
	7	Scalp.....	9
Operations on the blood vessels:		Upper extremity.....	2
Arteries—Ligation for rupture.....	2	Lower extremity.....	1
Veins—		Cauterization for—	
For varix—		Removal of warts.....	1
Ligation.....	8	Ulcer of skin.....	1
Excision.....	39	Skin grafting for—	
Schede's operation.....	3	Ulcer of leg.....	3
Intravenous injection of salvar-		Ulcer of foot.....	1
san for syphilis.....	434	Wound of lower extremity.....	3
Neosalvarsan—		Wound of upper extremity.....	2
For syphilis.....	1,662		120
For dysentery.....	1		
For idiopathic anemia.....	5	Operations on bones:	
For degeneration poste-		Reduction and splint applied for—	
rior column spinal cord.....	10	Fracture of—	
Antityphoid vaccine—		Radius.....	4
For prevention of ty-		Inferior maxilla.....	2
phoid fever.....	1,667	Tibia.....	3
	3,831	Tibia and fibula.....	2
Operations on the lymphatic organs:		Fibula.....	1
Incision and drainage—		Ulna.....	3
Bubo.....	102	Rib.....	1
Axillary glands.....	1	Femur.....	1
Cervical glands.....	5	Metacarpus.....	1
Hypertrophy of lymph glands		Radius and ulna.....	1
groin.....	1	Phalanx finger.....	2
Tuberculosis of lymph glands of		Dislocation of ulna.....	1
neck.....	3		

TABLE 6.—*Surgical operations performed during the fiscal year 1915—Contd.*

Operations.		Operations.	
Operations on bones—Continued.		Operations on joints:	
Reduction and plaster cast applied for—		Excision of bone for—	
Fracture of—		Infection of ankle joint.....	1
Foot.....	2	Ankylosis of ankle joint.....	2
External malleolus.....	1	Reduction of dislocation of—	
Tibia.....	1	Shoulder.....	5
Tibia and fibula.....	5	Head of humerus (manipulation).....	1
Femur.....	1	Ankle.....	1
Bone exposed and Lane's bone plate applied for—		Thumb.....	2
Fracture of—		Injection of formalin in glycerin, for acute inflammation of elbow.....	1
Tibia.....	2		13
Tibia and fibula.....	3		
Radius and ulna.....	1	Operations on muscles, tendons, and fascæ:	
Sherman's plate and splint applied, for fracture of tibia.....	1	Incision and drainage for—	
Albee's bonesplint applied for tuberculosis of lumbar vertebra.....	1	Suppuration of muscles of rectum.....	1
Incision and bones sutured for—		Suppuration of muscles of thigh.....	1
Fracture of—		Tenosynovitis.....	2
Ulna.....	1	Suppuration of muscles of buttock.....	1
Patella.....	1	Exploratory incision, for inflammation of tendon of hand.....	1
Sayer's dressing applied for fracture of clavicle.....	1	Sutured, for—	
Incision and bone nailed for—		Severed tendons.....	4
Fracture of—		Divided tendons.....	3
Humerus.....	1	Suture of tendon and capsule of knee joint, for fracture of patella.....	1
Femur.....	1	Adhesion of tendons broken up for ankylosis of shoulder.....	1
Incision and bone wired for fracture of inferior maxilla.....	3		15
Incision and removal of plate—			
Fracture of—		Operations on bursæ:	
Tibia.....	1	Incision and drainage for—	
Radius.....	1	Suppuration of prepatellar bursa.....	1
Incision and removal of nail with subsequent bone grafting for fracture of femur.....	1	Bursitis.....	1
Immobilized by plaster dressing for fracture of humerus.....	1	Excision for bursitis.....	4
Immobilized by strapping for fracture of ribs.....	5	Aspiration for bursitis.....	1
Bone exposed and loose fragments removed, for—			7
Fracture of—		Amputations:	
Phalanx of toe.....	1	For disease or injury of—	
Phalanx of thumb.....	1	Arm.....	2
Tibia and fibula.....	2	Foot.....	3
Incision and drainage for—		Finger.....	33
Necrosis of bone.....	1	Hand.....	2
Osteomyelitis.....	3	Leg.....	2
Tuberculosis of sternum.....	1	Toe.....	20
Whitlow of finger.....	4	Thumb.....	2
Incision and curettage for—		Thigh.....	1
Caries of bone.....	3		65
Necrosis inferior maxilla.....	3		
Necrosis of tibia.....	1	Operations on the skull and brain:	
Necrosis of frontal bone.....	1	Opened and drained for fracture of skull.....	1
Osteitis of tibia.....	1	Trephining for compression of the brain.....	1
Osteitis of metatarsal bones.....	1		2
Periostitis of tibia.....	1		
Osteomyelitis bone of foot.....	1	Operations on the spine and spinal cord:	
Osteomyelitis tibia.....	2	Subarachnoid injection of neosalvarsan for syphilis.....	1
Osteomyelitis femur.....	1	Injection of neosalvarsan into the spinal canal for degeneration of the posterior columns of the spinal cord.....	1
Tuberculosis of femur.....	1		2
Tuberculosis of tibia.....	1		
Wound of sternum.....	1		
Excision of portion of bone for—			
Necrosis of—		Operations on the face, nasal cavities, and mouth:	
Tibia.....	1	Excision for—	
Bones for the foot.....	8	Deviation of nasal septum.....	11
Ulna.....	1	Inflammation of tonsils, fol.....	27
Rib.....	1	Inflammation of tonsils, sup.....	2
Femur.....	3	Nasal polypus.....	5
Sternum.....	1	Hypertrophy of tonsils.....	20
Phalanx of finger.....	1	Adenoids.....	1
Inferior maxilla.....	1		
Phalanx of toe.....	1		
Osteomyelitis.....	3		
Hallux valgus.....	1		
Tuberculosis of spine.....	1		
Fracture of spine.....	1		
	112		

TABLE 6.—*Surgical operations performed during the fiscal year 1915—Contd.*

Operations.		Operations.	
Operations on the face, nasal cavities, and mouth—Continued.		Operation on the abdomen—Contd.	
Incision and drainage, for—		Gastrotony, for—	
Inflammation of tonsils, sup.....	4	Dropsy.....	1
Hematoma of nose.....	1	Peritonitis.....	2
Suppurative alveola.....	1	Ulcer of stomach.....	1
Plastic operation, for—		Gastro-enterostomy, for—	
Hypertrophy of turbinate bone..	1	Adhesion of intestines.....	1
Hypertrophy of mucous mem-		Ulcer of the stomach.....	4
brane of nose.....	1	Appendectomy.....	85
Lacerated wound of lip.....	1	Appendectomy (McBurney opera-	
Malformation of mouth.....	1	tion).....	5
Suture and dressing, for lacerated		Laparotomy and drainage, for ap-	
wound of the face.....	1	pendicitis.....	13
Plugging nares, for epistaxis.....	1	Colostomy, for intestinal obstruction	2
	78	Intestinal anastomosis, for—	
		Peritonitis.....	2
Operations on the eye and its append-		Gunshot wound of abdomen.....	2
ages:		Hernioplasty, for—	
Operation for entropion.....	145	Femoral hernia.....	5
Excision, for—		Inguinal hernia—	
Pterygium.....	4	Bassini operation.....	137
Cataract.....	3	Bassini operation, modified.....	75
Cyst of eyelid.....	1	Ferguson's operation.....	14
Foreign body in cornea.....	9	Ferguson's operation, mod-	
Foreign body in conjunctiva.....	2	ified.....	8
Incision and drainage, for—		Andrew's operation.....	4
Dacryocystitis.....	2	Andrew's operation, mod-	
Infection of eyelids.....	1	ified.....	9
Passage of sound, for dacryocystitis	1	Halsted operation.....	6
Grattage for trachoma.....	784	Unclassified.....	46
Plastic separation, for wound of eye-		Strangulated inguinal hernia.....	4
lid.....	1	Umbilical hernia.....	2
Muscles clipped, for internal squint..	1	Ventral hernia.....	3
Iridectomy for glaucoma.....	2	Ventral hernia (Mayo's opera-	
	956	tion).....	2
		Omental hernia, old.....	1
Operations on the ear:		Operation for closure of fecal fistula..	1
Incision of the membrana tympani,		Cholecystotomy, for—	
for tuberculosis of the middle ear..	1	Cholecystitis.....	6
Otitis media, suppurative.....	1	Calculus in gall-bladder.....	2
Incision and curettage, for—		Nephro-lithotomy.....	1
Mastoiditis.....	1		461
Necrosis of middle ear.....	1		
Incision and drainage, for mastoid-		Operations on the rectum and anus:	
itis.....	2	For fistula in ano—	
Mastoid section, for tuberculosis of		Excision.....	25
the middle ear.....	1	Excision and curettage.....	4
Inflammation of middle ear.....	1	Incision.....	11
Mastoiditis.....	1	Incised and packed.....	6
Removal of dead bone, for tubercu-		Incised, curetted, and packed.....	1
losis of the mastoid cell.....	1	Incised and curetted.....	11
Removal of wax.....	1	Curetted.....	2
	11	Curetted and cauterized.....	1
		Division of sphincter.....	1
Operations on the thorax and breast:		Curettage, for ulcer of rectum.....	1
Incision and drainage, for empyema.	1	Removal of part of rectum, for stric-	
Aspiration, for pleurisy with effusion.	1	ture of rectum.....	1
Thoracentesis, for—		Sutured and drained, for wound of	
Empyema.....	2	perineum and rectum.....	1
Pleurisy with effusion.....	1	Incision and drainage, for peripro-	
Tuberculosis of lung.....	1	ctitis.....	2
Resection of rib, for empyema.....	1	Colostomy, for carcinoma of rectum.	1
	7	Extra-peritoneal fixation, for pro-	
		lapse of rectum.....	1
Operations on the abdomen:		Peritoneal section, for abscess of	
Paracentesis of abdomen.....	5	peritoneum.....	1
Abdominal section, for—		For hemorrhoids—	
Abdominal adhesions.....	1	External—	
Intestinal obstruction.....	4	Excision.....	38
Abscess of liver.....	2	Clamp and cautery.....	7
Tubercular peritonitis.....	1	Ligation.....	1
Exploratory laparotomy, for—		Whitehead operation.....	1
Displacement of stomach.....	1	Pilcher operation.....	3
Tuberculosis of chest wall.....	1	Internal—	
Ulcer of stomach.....	1	Excision.....	9
Ulcer of duodenum.....	1	Clamp and cautery.....	10
		Dilatation of rectum.....	1
		Injection.....	1

TABLE 6.—*Surgical operations performed during the fiscal year 1915—Contd.*

Operations.		Operations.	
Operations on the rectum and anus—Continued.		Operations on the male generative organs—Continued.	
For hemorrhoids—Continued.		Scrotum and testicles—	
Mixed—		Scrotum—	
Excision.....	10	Operation for hydrocele—	
Clamp and cautery.....	10	Bottle operation.....	7
Ligation.....	3	Excision of sac.....	12
Modified Whitehead operation.....	1	Incision.....	8
		Tapping.....	9
	165	Volkmann's operation.....	2
		Bergmann's operation.....	1
		Unclassified.....	6
Operations on the bladder and urethra:		Operation for varicocele—	
Bladder—		Ligation and cutting of vein.....	1
Lithotomy, suprapubic.....	3	Phlebectomy.....	55
Incision and drainage, for tumor of bladder.....	1	Excision of the spermatic cord, fr tuberculosis of.....	1
Abdominal section and exploratory laparotomy, for carcinoma of the bladder.....	1	Epididymoectomy, for epididymitis.....	7
Urethra—		Dissection for fistula of scrotum.....	1
Organic stricture—		Excision, for—	
Gradual dilatation.....	6	Syphilis of scrotum.....	1
Forcible dilatation.....	4	Tuberculosis of scrotum.....	1
Urethrotomy, external.....	10	Incised and curetted for sloughing of scrotum.....	1
Urethrotomy, internal.....	12	Testicle—	
Urethrotomy, external and internal.....	1	Castration, for—	
Fistula—		Tubercullis of testicle..	7
Plastic operation.....	2	Carcinoma.....	1
Incised and packed.....	1	New growth, nonmalignant.....	1
Dissection.....	1	Granuloma fungoides.....	1
External urethrotomy for extravasation of urine.....	2	Epididymitis, acute.....	1
	44	Undescended testicle.....	1
		Orchidectomy, for tuberculosis of testicle.....	1
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